Idaho
National
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Laboratory

INEL-95/0408

August 1995

Post-Record of Decision Monitoring for the Test Reactor Area Perched Water System Operable Unit 2-12

Second Annual Technical Memorandum

R. C. Arnett
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ABSTRACT

This document presents the first 2 years of post Record Of Decision groundwater monitoring data and a data evaluation for the Idaho National Engineering Laboratory Test Reactor Area Deep Perched Water System. The data were collected and evaluated according to a published monitoring plan. The purposes of the monitoring are to a) verify the accuracy of contaminant of concern concentration trends in the Snake River Plain aquifer predicted by computer modeling and b) evaluate the effect that discontinued discharge to the former Warm Waste Ponds has on contaminant of concern concentrations in the aquifer and the deep perched water system.

Expectations of contaminant concentration patterns have been met in most cases. In some cases, expected declines in tritium and chromium have not occurred as expected. It is recommended that aquifer well TRA-8 be sampled for at least one round and the frequency of sampling be reduced to semi-annually for all deep perched water system wells except for USGS-53 which has shown a recent increase in chromium.

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ACRONYMS

CWP	Cold Waste Ponds
FFA/CO	Federal Facility Agreement/Consent Order
FPDWS	Federal Public Drinking Water Standard
DPWS	Deep Perched Water System
INEL	Idaho National Engineering Laboratory
OU	Operable Unit
QA	Quality Assurance
RESL	Radiological and Environmental Sciences Laboratory
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SI	Scoping Investigation
SRP	Snake River Plain
TM	Technical Memorandum
TRA	Test Reactor Area
USGS	U. S. Geological Survey
UTL	Upper Tolerance Limit
WAG	Waste Area Group

Post-Record of Decision Monitoring for the Test Reactor Area Perched Water System Operable Unit 2-12

1. INTRODUCTION

A series of infiltration ponds have been operated at the Idaho National Engineering Laboratory (INEL) Test Reactor Area (TRA) for the purpose of receiving low-level contaminated wastewater starting in the 1950s. Infiltrating water created a deep perched water system (DPWS) between the surface ponds and the regional Snake River Plain (SRP) aquifer. Contaminants have migrated from the ponds to the perched system and in some cases to the aquifer. Low-level radioactive waste discharges to the pond system were discontinued on August 12, 1993 when the former Warm Waste Ponds were replaced with lined evaporation ponds. Residual amounts of contaminants remain in the soil column, the DPWS and in the SRP aquifer. A Remedial Investigation (RI) of the perched water system and the affected portion of the aquifer was completed in 1992 under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) regulations and a Federal Facility Agreement/Consent Order (FFA/CO) between the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the Idaho State Department of Health and Welfare. The Record of Decision (ROD) for the TRA Perched Water System, Operable Unit (OU) 2-12 at the INEL was issued in December 1992. The selected remedy was no action with groundwater monitoring and a 3-year review of the monitoring program.

Expand

1.1 Purpose

The purpose of this technical memorandum is to present the first 2 years of post-ROD groundwater monitoring data and a data evaluation for the INEL TRA Deep Perched Water System, OU 2-12. It is the second of a 3-year annual series.

What about ROD/RI-FS modeling results

1.2 Background

The post-ROD monitoring plan (Dames and Moore, 1993) provides the direction for implementing ~~supporting~~ the ROD. The monitoring plan requires that a Technical Memorandum (TM) be prepared annually during the 3-year review period to formally document the data collected and the data evaluation performed under the auspices of the plan. Development of plans for further monitoring will be based on an evaluation of data from the 3-year monitoring period and the results of the Waste Area Group (WAG) 2 comprehensive Remedial Investigation/Feasibility Study (RI/FS).

The objectives of the post-ROD monitoring as stated in the monitoring plan and the ROD are to:

- Verify the accuracy of contaminant of concern concentration trends in the Snake River Plain (SRP) aquifer predicted by computer modeling

- Evaluate the effect that discontinued discharge to the former Warm Waste Ponds have on contaminant of concern concentrations in the SRP aquifer and the deep perched water system.

To support the ROD alternative selected.

Three data analysis techniques were identified in the monitoring plan to support the project objectives:

- Compare post-ROD monitoring concentrations to the model predicted concentrations.

- Evaluate concentration trends with respect to calculated tolerance intervals.

- Evaluate observed concentrations in response to discontinued discharge to the Warm Waste Pond.

The first memorandum addressed the first year of post-ROD sampling (Jessmore, 1994). This memorandum is the second in the annual series and fulfills the monitoring plan requirement.

1.3 Scope

Data and evaluations contained in this memorandum fulfill the requirements in Section 2.14 of the post-ROD monitoring plan. OU 2-12 data presented herein were collected during the first eight rounds of sampling (July 1993 - April 1995). The U.S. Geological Survey (USGS) routinely collects water level and contaminant data across the INEL. Data collected by the USGS from more than 20 wells in the vicinity of the TRA are also presented and evaluated to assist the FFA/CO agencies in determining whether modifications to the OU 2-12 monitoring program are necessary. In addition to the requirements specified in the monitoring plan, an assessment of the OU 2-12 RI/FS predictive model assumptions is included in this memorandum to aid the WAG 2 comprehensive RI/FS review of past FFA/CO decisions and investigations. The model assessment will also assist in explaining deviations between model predictions and monitoring data.

2. TRA GROUNDWATER MONITORING

Groundwater monitoring in the TRA vicinity is conducted for OU 2-12 according to the post-ROD monitoring plan and also by the USGS as part of a routine, site-wide monitoring network. The two monitoring efforts are complementary in the number of wells sampled and the set of analytes measured in the samples.

2.1 OU 2-12 Groundwater Monitoring

The post-ROD monitoring network for OU 2-12 consists of six deep perched and three aquifer wells in the vicinity of the TRA. The location of these wells is shown in Figure 1. Figure

2 illustrates a generalized cross-section of the shallow and deep perched water zones, and the

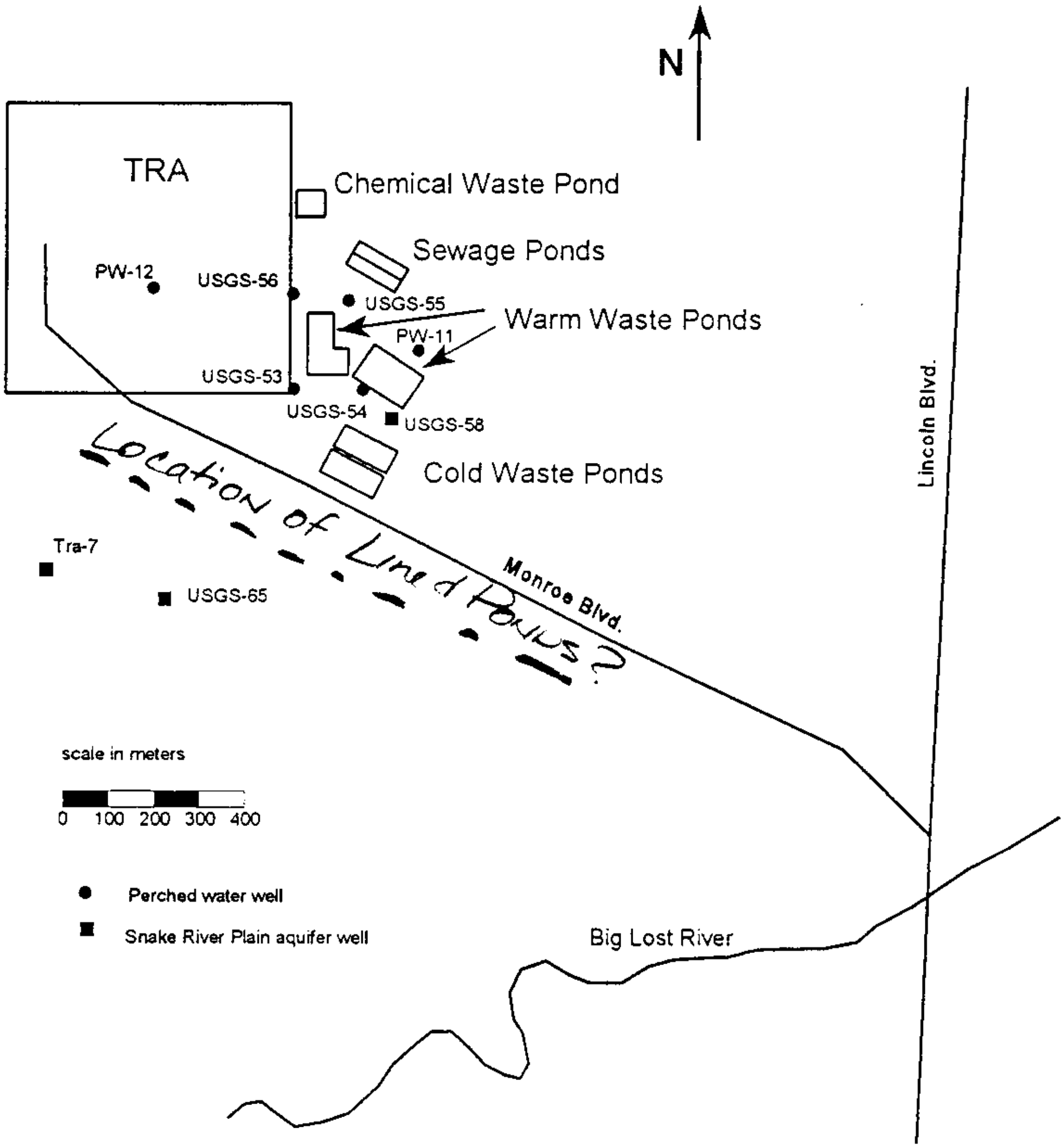
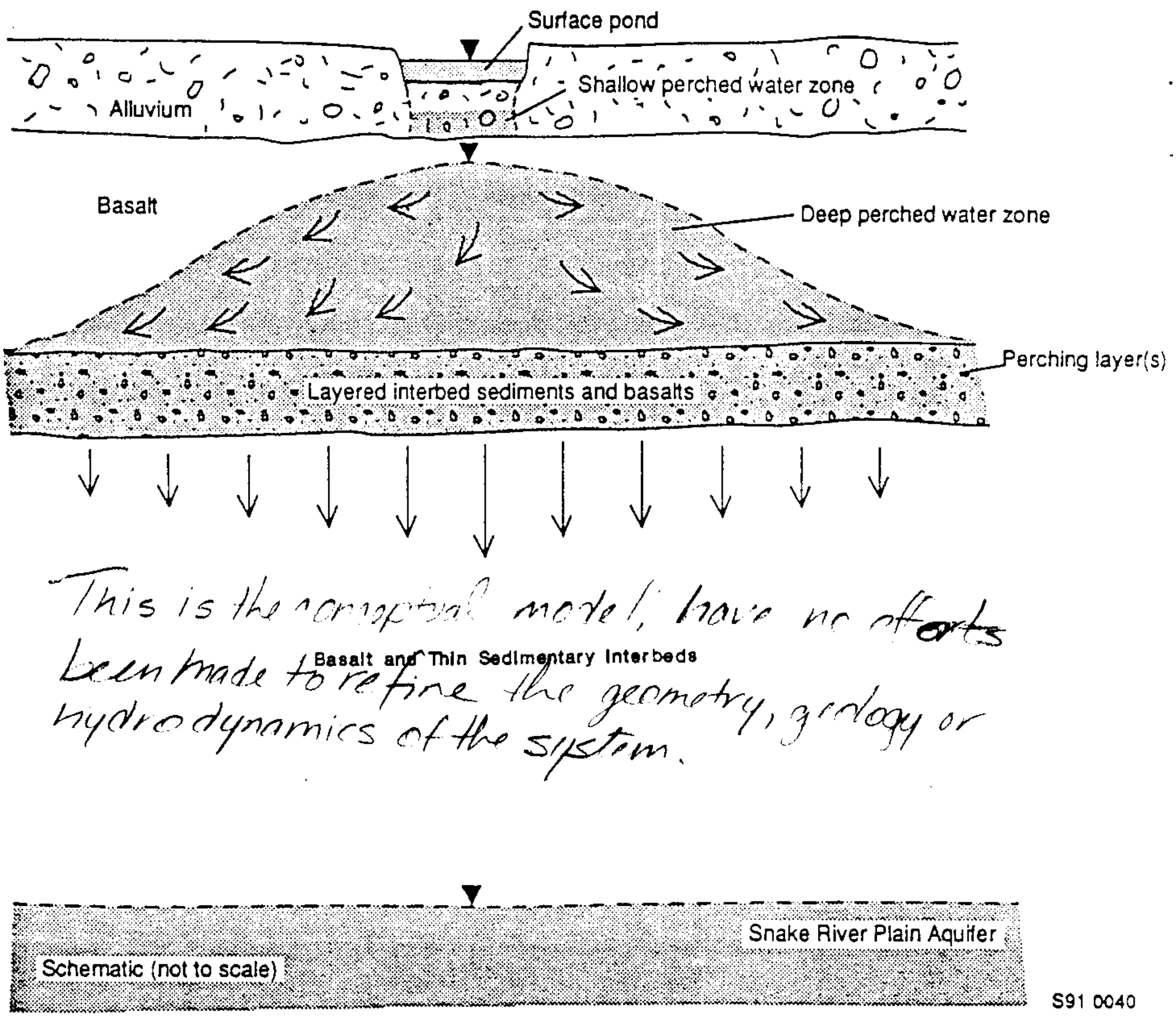


Figure 1. TRA deep perched water system post-ROD groundwater monitoring well network

Snake River Plain (SRP) aquifer beneath the TRA. The DPWS occurs on top of a low permeability interbed positioned at a depth of approximately 140 to 150 feet below land surface. Water from the DPWS eventually recharges the SRP aquifer approximately 300 feet below the deep perched system (approximately 500 feet below land surface).

define

the aquifer or the DPWS?



This is the conceptual model; have no efforts been made to refine the geometry, geology or hydrodynamics of the system.

Figure 2. Generalized cross section of the perched zones beneath TRA

The list of wells in the OU 2-12 monitoring network is unchanged from the first year of monitoring as specified in Jessmore (1994) and includes deep perched and aquifer wells. The wells monitoring the deep perched system are:

PW-11	PW-12
USGS-53	USGS-54
USGS-55	USGS-56

The wells monitoring the aquifer are:

TRA-7

USGS-58
USGS-65

Post-ROD sample collection for OU 2-12 began in July 1993. Subsequent samples from the deep perched system wells were collected quarterly in October 1993, January, April, July, and October 1994, and January and April 1995. Samples from the SRP aquifer wells were collected semiannualy in July 1993, January and July 1994, and January 1995. Water levels were measured prior to sample collection.

Samples from each well in the monitoring network were analyzed for inorganic and radiological contaminants of concern in accordance with the monitoring plan. The contaminants of concern are identified in the final remedial investigation report (Lewis et al., 1992). The radiological contaminants of concern are:

Americium-241
Cesium-137
Cobalt-60
Strontium-90
Tritium

We need a brief statement focused on the why these are CoCs..

The ~~nonradiological~~ inorganic contaminants of concern are:

Arsenic
Beryllium
Cadmium
Chromium (total and hexavalent)
Cobalt
Lead
Manganese
Fluoride

2.2 Deviations From The Monitoring Plan

redundant

Field sampling was conducted in accordance with the OU 2-12 monitoring plan (Dames and Moore, 1993). There were no deviations from the plan during the second year (rounds 5-8) of the post-ROD monitoring. During the first year of post-ROD sampling, samples were collected from two additional wells (TRA-4 and PW-13) as discussed in Jessmore (1994), but no samples were collected from those wells during the second year. Sample data collected from wells TRA-4 and PW-13 are reported in Jessmore (1994), but included herein?

2.3 USGS TRA Deep Perched Groundwater Monitoring

The USGS is an independent agency funded partially by DOE that maintains groundwater monitoring networks at the INEL to characterize the occurrence, movement, and quality of water and to delineate waste-constituent plumes in the SRP aquifer and the perched groundwater systems overlying the aquifer (Cecil, et al., 1991). These networks, including one at TRA, consist of wells from which water-level and water-quality data are periodically obtained. The USGS network for the perched groundwater system at TRA was designed to (1) determine hydraulic gradient changes that influence the rate and direction of groundwater movement and transport of radioactive and chemical constituents, (2) measure the areal extent of the effects of recharge, (3) identify contaminant concentrations, and (4) define the pattern of waste migration in the SRP aquifer.

The USGS perched groundwater monitoring network at TRA is in several ways complementary to the OU 2-12 post-ROD perched water monitoring network. The OU 2-12 network includes six deep perched system wells that are sampled quarterly and analyzed for five radiological and nine nonradiological constituents. The USGS deep perched monitoring well network includes 18 wells, most of which are sampled semiannually and the samples are generally analyzed for fewer constituents. Thus, the USGS network provides a better areal view of contaminant concentration changes for a few constituents, whereas the OU 2-12 network provides a more detailed view of changes at fewer wells. The wells in the OU 2-12 and USGS perched groundwater networks since 1991 are shown on Figure 3 and listed in Table 1. Other deep perched wells that were sampled for the TRA Scoping Investigation (SI) (Doornbos et al., 1991) in 1991 are also shown on Figure 3 because data from those wells were used to develop the water elevation contour map in the monitoring plan (Dames and Moore, 1993) and are used to show pre-ROD conditions later in this report.

A good summary of the sample collection methods and quality control and quality assurance methods is presented in the U. S. Geological Survey - Water Resources Division Quality Assurance (QA) Plan, INEL project office, Quality of Water Activities. That QA plan is an internal USGS document, but is available for review at the USGS INEL offices. It discusses Sample Containers and Preservatives, Field Equipment, Decontamination Procedures at the Well Head, and Sample Collection as well as aspects of quality control related to the USGS laboratory and field analyses. In general, about 10 percent of the samples collected are dedicated to QA purposes in the form of a blind, a replicate, a blank, or other forms of QA samples.

The USGS samples are analyzed for radioactive constituents by the INEL Radiological and Environmental Sciences Laboratory (RESL). A discussion of procedures used for the analysis of radionuclides in water by RESL is provided in Bodnar and Percival, eds. (1982). Inorganic and other constituents are analyzed by the USGS National Water Quality Laboratory in Denver, Colorado. Additional quality assurance implemented by the USGS INEL project office is consistent with procedures used by the USGS National Water Quality Laboratory.

2.4 USGS Aquifer Groundwater Monitoring

Wells that penetrate the aquifer in the TRA area are shown in Figure 4. Wells TRA-1 through TRA-4 are water supply wells and are not usually measured for water levels. However, they are sampled for possible contamination by the USGS and the contaminant concentration data are presented in later sections of this report.

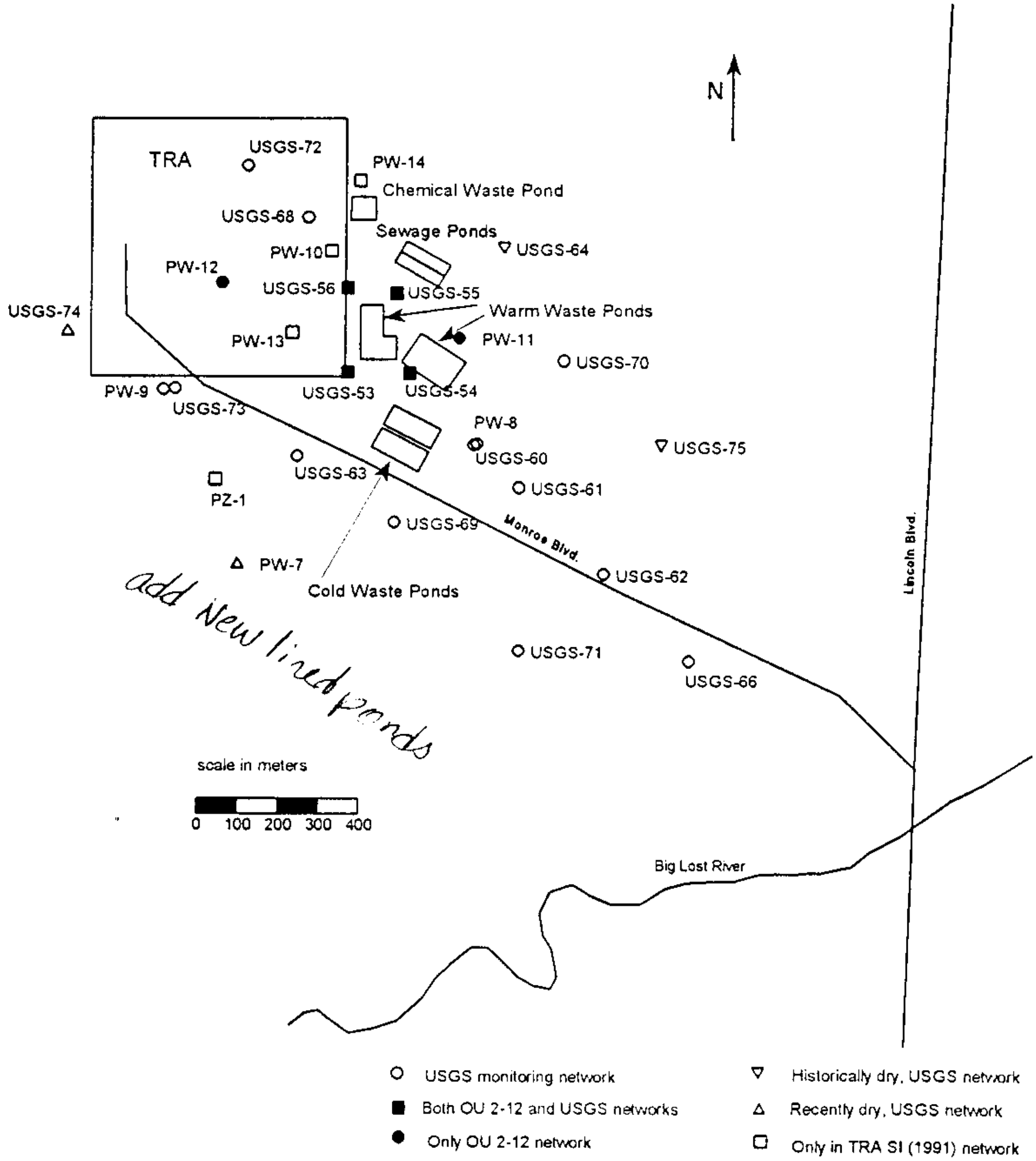


Figure 3. TRA deep perched water zone well locations

Table 1. Monitoring schedule for TRA Deep Perched Water Wells

	OU 2-12 Schedule		USGS Schedule	
Well Name	Water Level	Sampling	Water Level	Sampling
PW-07	-	-	S	S
PW-08	-	-	Q	Q
PW-09	-	-	S	S
PW-11	Q	Q	-	-
PW-12	Q	Q	-	-
USGS-53	Q	Q	Q	Q
USGS-54	Q	Q	Q	Q
USGS-55	Q	Q	Q	Q
USGS-56	Q	Q	Q	Q
USGS-60	-	-	Q	S
USGS-61	-	-	Q	S
USGS-62	-	-	Q	S
USGS-63	-	-	Q	S
USGS-66	-	-	M	A
USGS-68	-	-	Q	S
USGS-69	-	-	Q	A
USGS-70	-	-	Q	S
USGS-71	-	-	Q	S
USGS-72	-	-	Q	A
USGS-73	-	-	Q	A

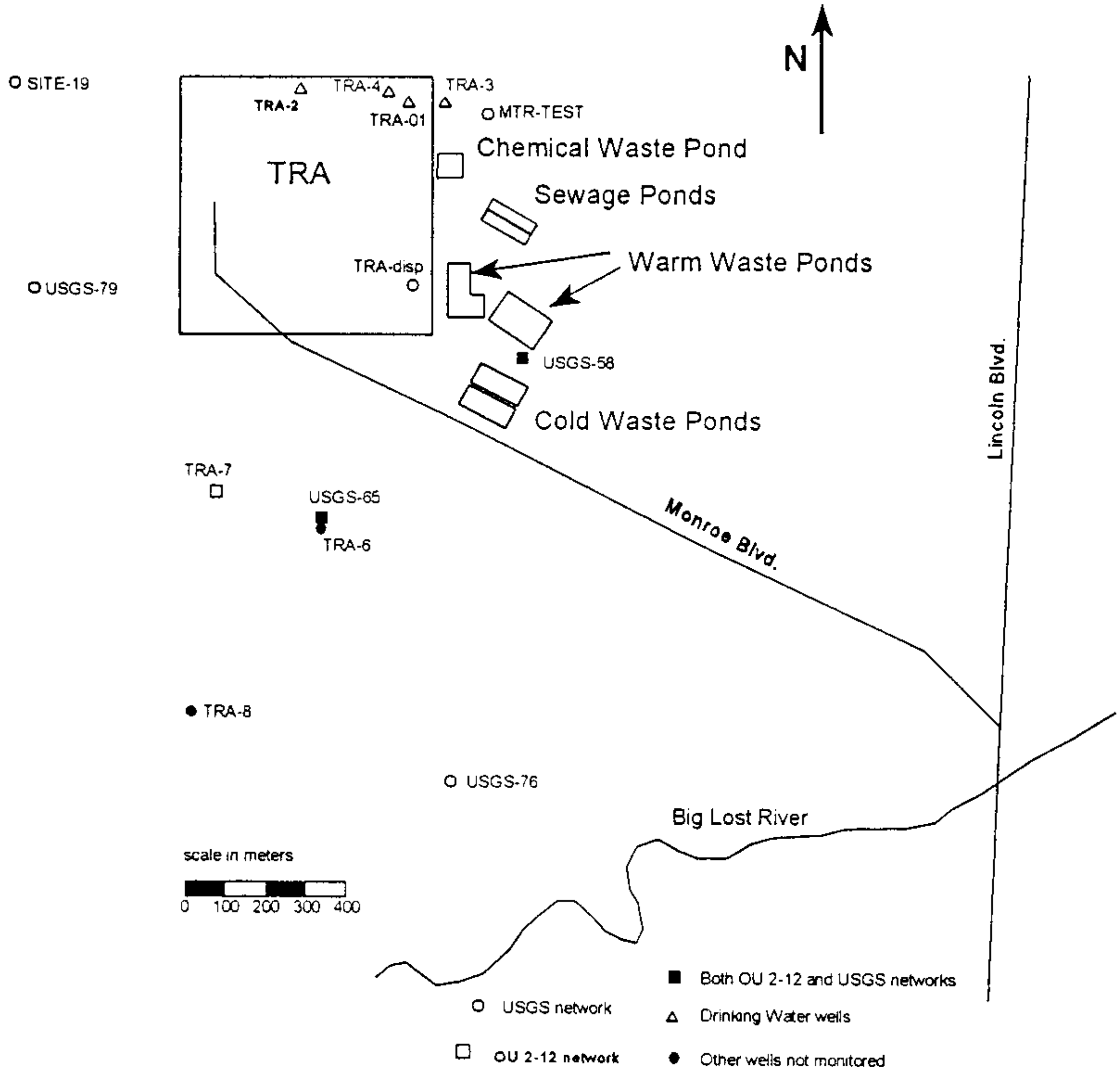


Figure 4. TRA aquifer wells

Wells TRA-6 and TRA-8 were part of the SI monitoring network, but neither water levels nor water samples have been collected in those wells since 1991. Positive displacement pumps remain in the wells and inhibit water level measurement. ← briefly include a why? refer to the previous memo

3. PERCHED WATER HEAD PATTERNS

← Can we use a different term?

As stated in the introduction, one of the project objectives is to evaluate observed ·tions in the DPWS and SRP aquifer in response to discontinued discharge to the former or closed ·e Ponds. Differences in elevation of groundwater above some datum (usually mean sea level) are a measure of the driving force for groundwater flow. The distribution of groundwater elevation or hydraulic heads in the DPWS will strongly influence the transport of contaminants through the DPWS to the SRP aquifer. Perched water elevations or hydraulic heads indicate the potential flow patterns.

This section presents an assessment the responses of DPWS heads to changes in discharge rates to the surface ponds. Changing discharge rates to all surface ponds was considered in evaluating the relative effects of discontinued discharge to the Warm Waste Ponds. This is accomplished by assembling DPWS water level data from both the OU 2-12 and USGS monitoring networks, calculating heads, plotting head vs. time at selected wells, preparing pre-ROD and recent head contour maps of the DPWS, plotting the pond discharge rates vs. time, and comparing head changes in time and space with changing discharge rates. Finally, a short evaluation of head responses (or lack of response) to the discharge changes is presented.

Where is this manipulation of data explained?

3.1 Water Levels Collected for OU 2-12

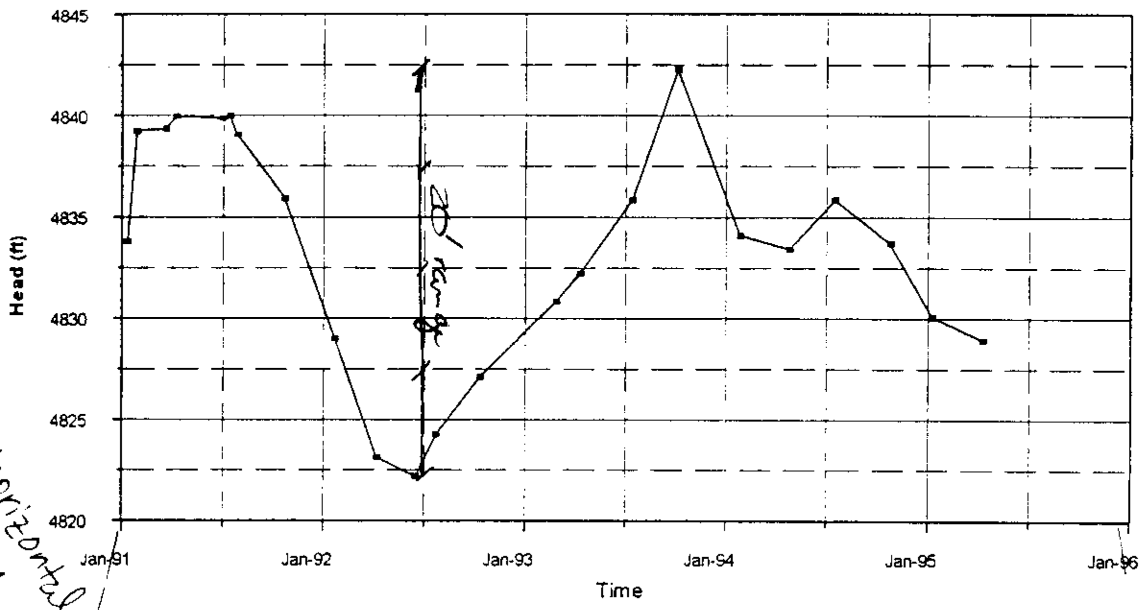
Depths to water were measured quarterly for the six perched water wells in the OU 2-12 monitoring network with a few exceptions. Water levels were not measured in wells USGS-53, USGS-55, and USGS-56 in April 1995 because of an equipment malfunction. Measured depths to water and calculated perched groundwater elevations (heads) are presented in Appendix A. Groundwater elevations or heads are calculated by subtracting depth to water from the elevation of the land surface datum which is usually identified by a brass cap on the concrete pad surrounding the well. Land surface data (brass cap) measured by Beard (1993) were used to calculate perched and aquifer heads.

3.2 Water Levels Collected by the USGS

Water levels were measured by the USGS in their TRA perched water network wells according to the schedule shown in Table 1. Annual attempts to measure water levels in wells USGS-64 and USGS-75 (see Figure 3) have ~~yielded~~ indicated dry holes since 1976. Well USGS-74 has been dry since the March 1993 sampling and PW-7 has been dry since the October 1994 sampling.

3.3 Perched Water Head vs. Time Plots

Hydraulic head since 1991 versus time are plotted on Figures 5 through 7 for wells USGS-61, USGS-54, and PW-12, respectively. Both OU 2-12 and USGS data are included, as applicable. Well USGS-54 is located at the edge of the former Warm Waste Ponds and near the Cold Waste Ponds (see Figure 3). Well PW-12 is northwest and well USGS-61 is southeast of the ponds. These wells are located along the long axis of the TRA deep perched water system and hydrographs of these wells give a representative picture of the temporal changes in the DPWS. In July 1992, heads fell to a minimum for the post-1991 period for both USGS-54 and USGS-61. Water level data are not available during 1992 for PW-12. Peak heads for the post-1991 period occur in USGS-54 and USGS-61 during October 1993. A local peak also occurs in PW-12 at that time. Plots of other wells in the OU 2-12 and USGS networks are presented in Appendix B.



Same horizontal scale, why different

Figure 5. Hydrograph of well USGS-61

inclusion of a figure that includes all these hydrograph, clearly demonstr patterns, trends and variances

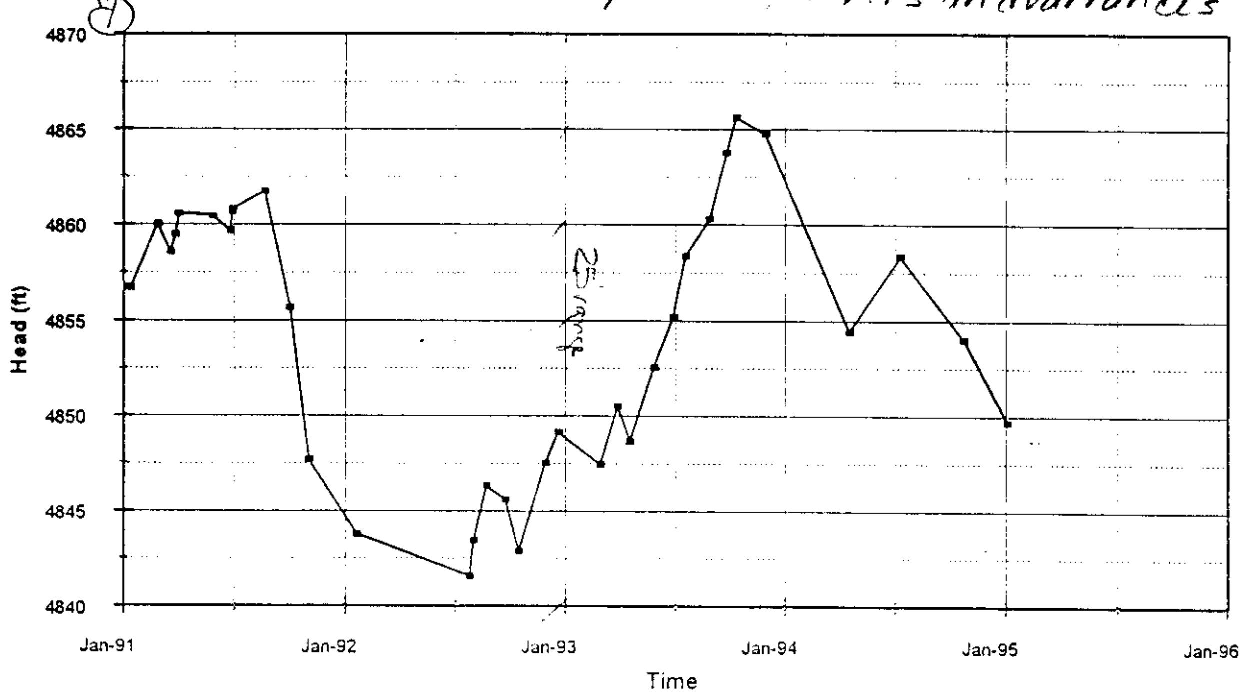


Figure 6. Hydrograph of well USGS-54

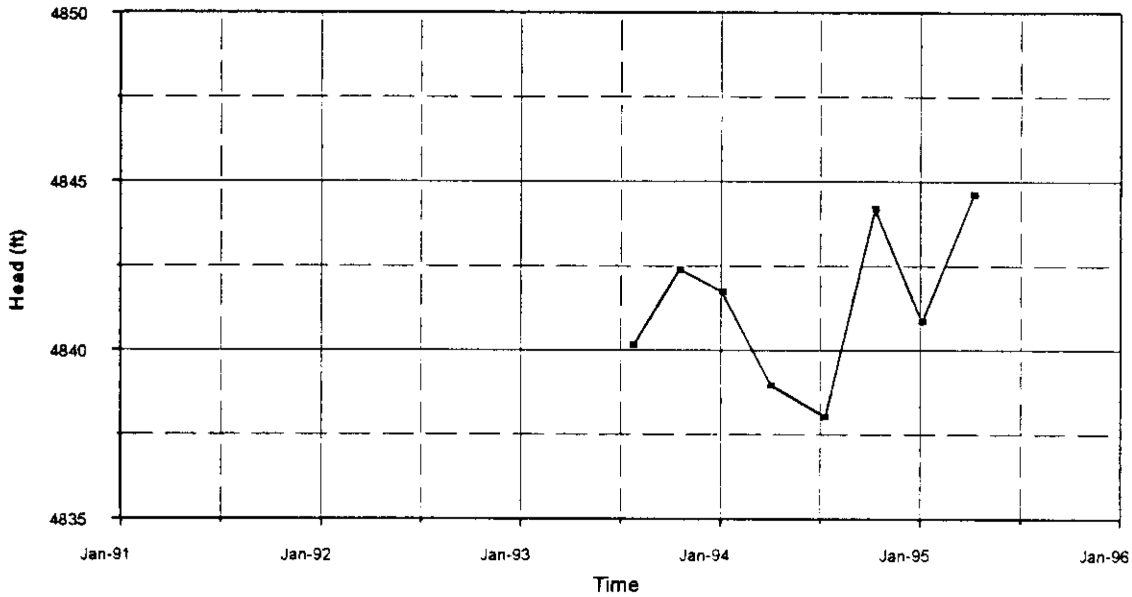


Figure 7. Hydrograph of well PW-12

3.4 Liquid Discharges vs. Groundwater Heads

The TRA deep perched water system has received water by infiltration from several different sources. These sources have included the Cold Waste Ponds, the former Warm Waste Ponds, Chemical Waste Pond, Sewage Ponds, and the Retention Basin. Well USGS-53 was used as a temporary and intermittent waste discharge point in the 1960s.

On August 12, 1993, discharge to the Warm Waste Ponds was discontinued, and the low-level radioactive wastewater stream previously discharged there was diverted to a newly constructed and lined evaporation pond. In the first 7 months of 1993. 14 million gallons of water were discharged to the Warm Waste Ponds. For purposes of comparison, 158 million gallons were discharged to the Cold Waste Ponds, 8.7 million gallons to the Sewage Ponds, and 4.4 million gallons to the Chemical Waste Pond during the same period. It is estimated that approximately 25 million gallons per year leaked from the Retention Basin during its operation through 1993. Discharges to the Cold Waste Pond thus represented 85% of the sum of infiltrating water from ponds and the Retention Basin during the first 7 months of 1993.

Plots of disposal rate versus time to the Cold Waste Ponds, Warm Waste Ponds, Sewage Waste Ponds, and the Chemical Waste Pond are shown on Figure 8 to assist in evaluating the historical influence of changing discharge rates on the head patterns. The plots on Figure 8 illustrate that discharges to the Cold Waste Pond from January 1991 through July 1993 represented the bulk of the total TRA liquid disposal to ground. Periods of low discharge rate to the Cold Waste Pond correlate well with periods of low water elevations in wells USGS-61

(Figure 5) and USGS-54 (Figure 6). Likewise, periods of high discharge rate correlate well with peak heads in the same two wells. There is less correlation between discharges to the Cold Waste Ponds and well PW-12; the increase in head from January 1995 to April 1995, in particular, appears to be counter-correlated.

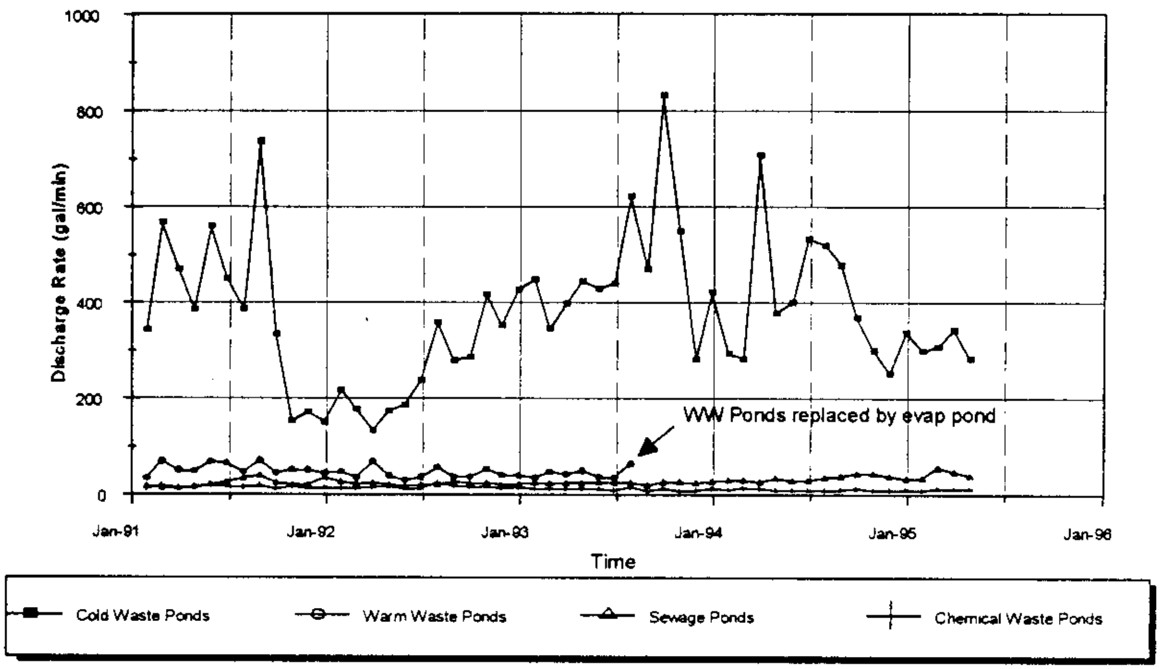


Figure 8. Liquid disposal rate to surface ponds

In summary, the incremental reduction in the total rate of water infiltrating to the DPWS resulting from replacing the Warm Waste Ponds with a lined evaporation pond appears to be minor. Based on this observation, the significance of the Warm Waste Pond shutdown is predominantly in the discontinuance of contaminant release to the subsurface.

In order to better visualize the comparison of head change and disposal rate to the Cold Waste Pond (CWP), heads from wells surrounding the pond were plotted together with the CWP disposal rate. Figure 9 is a scatter diagram of CWP disposal rate and head for wells USGS-53, USGS-54, USGS-55, USGS-56, USGS-60, USGS-63, and USGS-69 (see Figure 3) vs. time. Both OU 2-12 and USGS data were used. In general, heads in all the surrounding wells respond well to changes in CWP disposal rate. The wells southeast of the CWP (USGS-60 and USGS-69) display a stronger response (larger relative head change) than wells the northwest of the CWP. USGS-56 shows the smallest response and is also the furthest from the CWP of those wells included on Figure 9. These data suggest that water flow through the DPWS is not symmetrical; a larger fraction of water disposed to the CWP flows through the southeast portion than the northwest portion of the DPWS. This implies a more rapid contaminant flushing in the southeast portion than the northwest portion and is consistent with the contaminant concentration results presented later in this report.

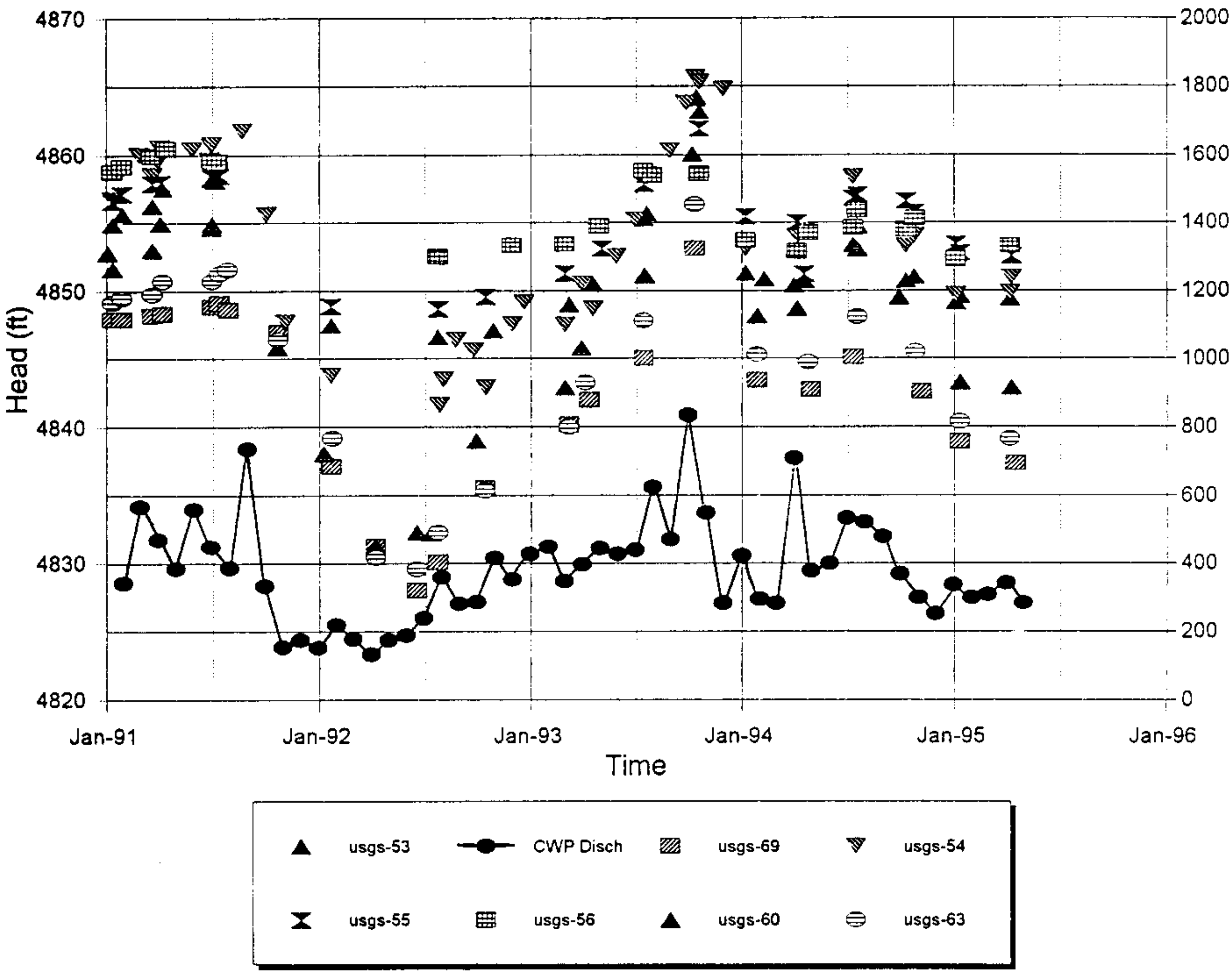


Figure 9. Heads and CWP disposal rate vs. time for wells surrounding the CWP

Figure 10 is a scatter diagram of time vs. disposal rate to the CWP and heads in wells USGS-68, USGS-72, and PW-12. Those wells are located in the extreme northwest portion of the DPWS. The striking feature on Figure 10 is the lack of correlation between CWP disposal rate and head. The lack of correlation indicates that head and water flow in wells in the extreme northwest of the DPWS are not strongly influenced by discharges to the CWP. Either there is a slow transfer of water between that area and the rest of the DPWS or another water source is more influential. Heads in well USGS-68 are generally higher than the heads in any other DPWS well. This also suggests that well USGS-68 is located in hydrogeologic environment that is separate and distinct from that in the central portion of the DPWS near the CWP. The relative heads between USGS-68 and wells near the CWP (see Figure 9) indicate that only under conditions of very high heads near the CWP can water flow to the area near USGS-68. Another source of water, perhaps the Chemical Water Pond or even the Sewage Ponds which do not display the fluctuations in disposal rate would help explain the heads in USGS-68. Leakage from the water transfer system (water supply wells are located north of USGS-68, see Figure 4) cannot be ruled out as a small source.

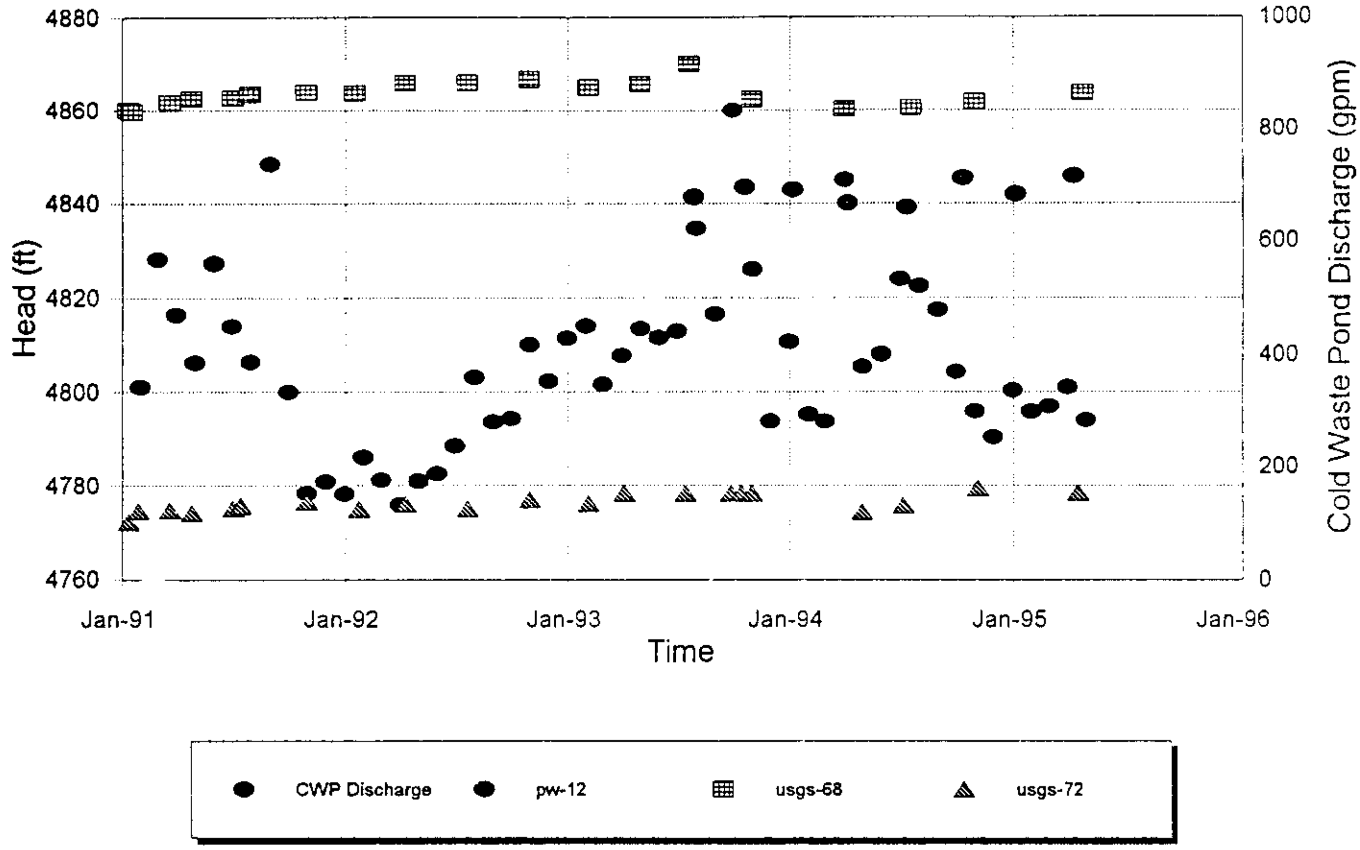


Figure 10. CWP disposal rate and heads for wells USGS-68, USGS-72 and PW-12

3.5 Perched Water Elevation Contour Maps

A contour map of the DPWS heads was prepared for the TRA Scoping Investigation (SI) (Doornbos et al, 1991). That map is reproduced as Figure 4 in the TRA Monitoring Plan (Dames and Moore, 1993). The SI monitoring network for the deep perched system included all 27 wells shown on Figure 3 herein. A contour map was reconstructed with the SI (March 1991) data using a computer contouring program. The reconstructed map is shown in Figure 11. A discussion of data selection and interpretation are presented in Appendix E. A contour map of deep perched system heads collected by both the OU 2-12 and USGS monitoring programs during April 1995 was also constructed with the computer contouring program as shown in Figure 12. Finally, a contour map of the decrease in head from January 1991 to April 1995 is shown in Figure 13. That figure shows that heads in the center of the deep perched water body decreased approximately 8 to 12 feet from 1991 to 1995. Heads in the northwestern portion increased slightly during the same period. Decreased heads over the majority of the DPWS are consistent with the pattern of reduced flow to the Cold Waste Pond in recent months.

There have been large changes in measured water levels in well USGS-66 located at the southeastern end of the DPWS monitoring network. Well USGS-66 is part of the USGS and SI monitoring networks, but is not part of the OU 2-12 network. In late 1994, the USGS recompleted the well by grouting below the 199-foot depth. The casing was perforated from 158-199 feet (personal communication from Brennon Orr, USGS). Depths prior the recompletion were approximately 213 feet below land surface. After the recompletion, depths to water have been about 179 feet. Because calculated heads since the recompletion are more representative of true heads in the DPWS, the 1991 head in USGS-66 used to prepare Figure 11 was adjusted from the value measured at the time to reflect the improved completion. For this reason, the southeastern portion of the March 1991 contour map is different from the map presented in the monitoring plan (Lewis, et al.,1993) and the TRA SI report (Doornbos et al., 1991). The hydrograph for USGS-66 is included in Appendix B.

Because 85% of the water discharged to surface disposal sites goes to the Cold Waste Ponds, it is reasonable to expect that the DPWS would be centered around the Cold Waste Ponds. In actual fact, the DPWS is currently and historically centered near the Warm Waste Ponds. This remains true today even though the Warm Waste Ponds were removed from service in 1993. However, the temporal head patterns in wells near the Warm Waste Pond reflect the temporal discharge pattern to the CWP. This suggests that there is a good deal of lateral spreading of the water in the shallow perched water prior to infiltration to the DPWS. Also, leakage from the water transfer system near the Retention Basin cannot be ruled out. If the hydraulic conductivity near and west of the former Warm Waste Ponds is low, a small local source of water could contribute to or even maintain the heads in the DPWS in the area west of the Warm Waste Ponds (inside the TRA fence). As discussed in the previous section, the heads further northwest do not reflect discharges to the CWP and the April 1995 observations show a net rise since 1991 in contrast to other portions of the DPWS. This rise could be a temporary phenomenon, or may be influenced by discharges to the Chemical Waste Pond or even the Sewage Ponds to the east. Small sources such as leaks in the water delivery system could also contribute.

An examination of the discharge history (see Figure 8) suggests that the lower discharge rates to the CWP in recent months may not be permanent and rates could increase in the future. The temporal variation in discharges to the CWP is greater than the average flow rate to the Warm Waste Pond during the last years prior to shutdown. Thus, it is expected that changes in discharge rates to the Cold Waste Pond will be reflected in the heads in most of the DPWS wells. The different head patterns in the northwestern portion of the DPWS suggest that heads in that portion of the DPWS may be governed by other sources.

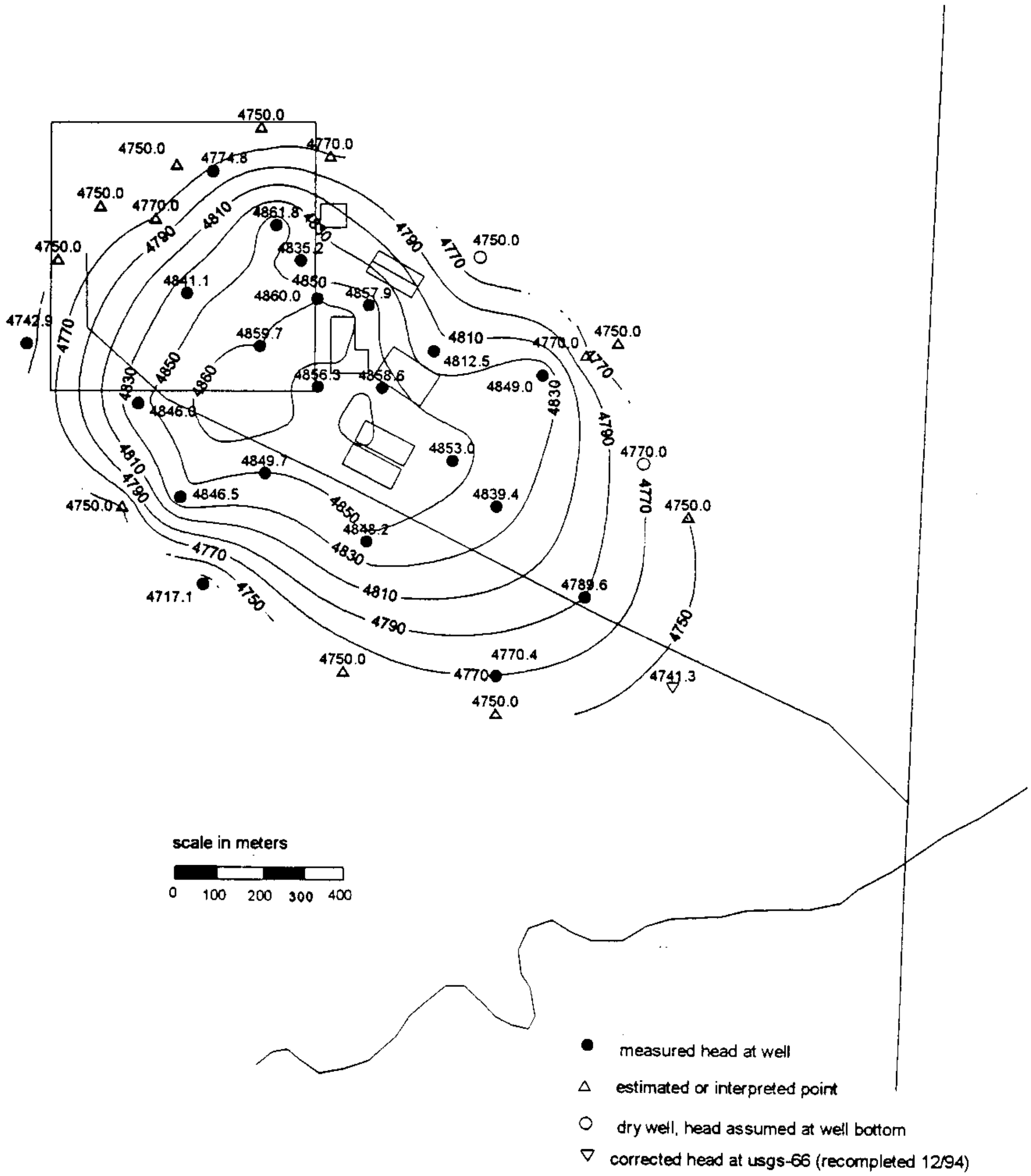


Figure 11. Deep Perched System contoured heads - March 1991

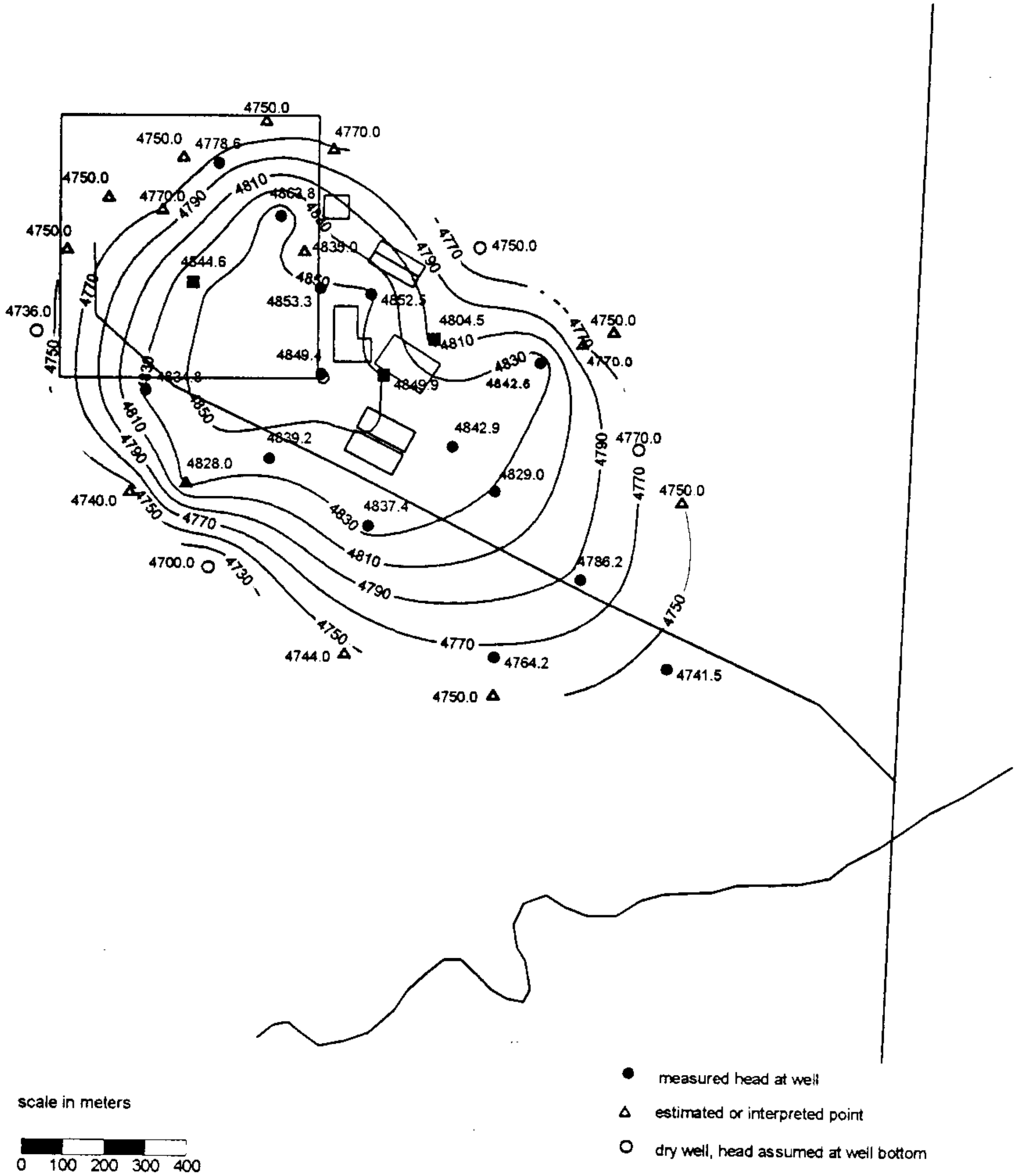


Figure 12. Deep Perched System contoured heads - April 1995

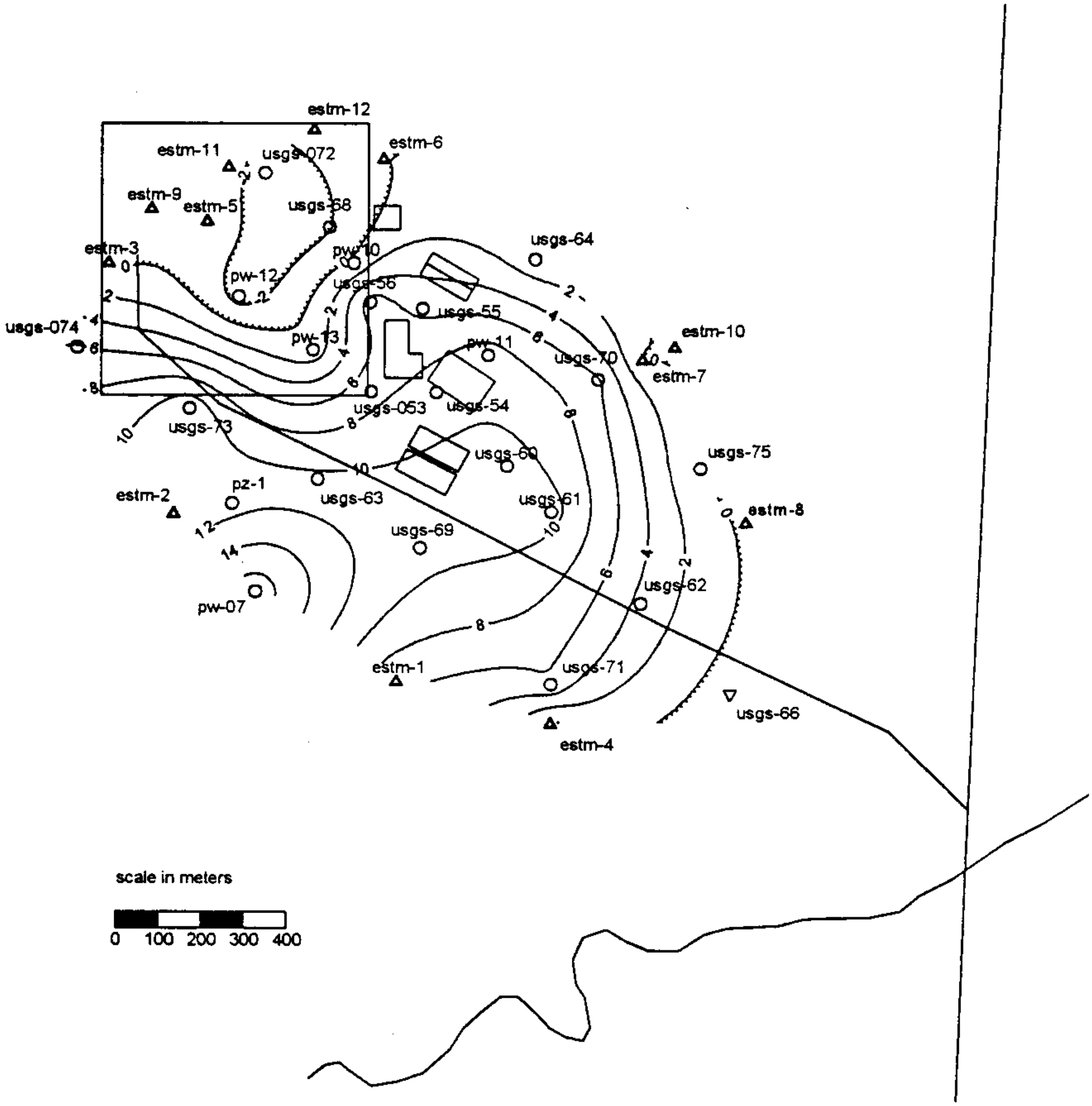


Figure 13. Difference contour map, March 1991 heads - April 1995 heads

3.6 Summary of Perched Water Head Patterns

In summary, head trends in most of the DPWS reflect changes in discharge rates to the Cold Waste Ponds. Wells in the northwestern portion of the DPWS (PW-12, USGS-68, and USGS-72) show a pattern that does not reflect the pattern of Cold Waste Pond discharges. This suggests that contaminant flushing in the DPWS varies widely with location. The flow conceptual model presented in Lewis et al. (1992) and reflected in Figure 2 is simplified. It continues to be useful as a preliminary model, but the fact that it ignores spreading in the shallow perched water system and the possible existence of other small sources is a limitation in describing the distribution of water and contaminants in the DPWS. There are areal variations in hydraulic properties (Bishop et al., 1992) that cause deviations from the smooth perched water mound shown in Figure 2.

4. AQUIFER HEAD PATTERNS

Changing head patterns in the aquifer can influence the contaminant concentration patterns. The flow rate of wastewater infiltrating to the aquifer from the ponds via the DPWS is small compared to the natural flow in the aquifer in the area. This results in small response of aquifer heads to changing discharge rates to the ponds. The primary purpose of this section is to assess the changing head patterns in the aquifer in terms of the possible influence on contamination patterns. An important subpurpose is to evaluation the effects of well completion on the aquifer heads. Effects of changing heads in the DPWS on the aquifer will also be assessed. The methods of accomplishing the stated purposes are similar to the methods used in the previous section for the DPWS. Well completions will be discussed as they influence the observed heads.

4.1 Aquifer Groundwater Monitoring Schedules

Water level data are collected semi-annually as part of the OU 2-12 monitoring program from wells USGS-58, USGS-65, and TRA-7. The USGS routinely measures water levels monthly (M), quarterly (Q), or semiannually (S) in wells USGS-58(Q), USGS-65(Q), USGS-76(S), USGS-79(S), Site-19(S), MTR-TEST(M), and TRA-DISP(S). Refer to Figure 4 for the location of these wells.

4.2 Aquifer Head vs. Time Plots

Hydrographs of aquifer elevation or head versus time for wells USGS-58, USGS-65, and TRA-7 are presented in Figures 14 through 16, respectively. The hydrograph of well USGS-58 and TRA-7 primarily reflect the influences of the regional aquifer, whereas the hydrograph of wells USGS-65 shows a small influence of recharge from the ponds via the DPWS. The head in USGS-65 is approximately 2 feet higher than expected from contouring the heads of nearby wells. Doornbos et al. (1991) found that heads in well TRA-6 (very near well USGS-65, see Figure 4) were more representative of the aquifer patterns and their contour map (Figure 3-24 of Doornbos et al, 1991) of the aquifer head for 1991 closely reflected the head in TRA-6 but not the head in USGS-65 which is 2 feet higher. The head in USGS-65 may reflect the fact that it is completed just above a sedimentary layer that may inhibit vertical mixing. Well TRA-6 is completed below that layer and appears to reflect more vertical mixing in the aquifer. Well USGS-58 is closer to the CWP, but exhibits a head pattern that is more indicative of mixing over a larger vertical portion of the aquifer. The heads in USGS-58 and TRA-7 are consistent with the pattern of other aquifer wells in the area. Hydrographs of the other TRA aquifer wells are presented in Appendix B.

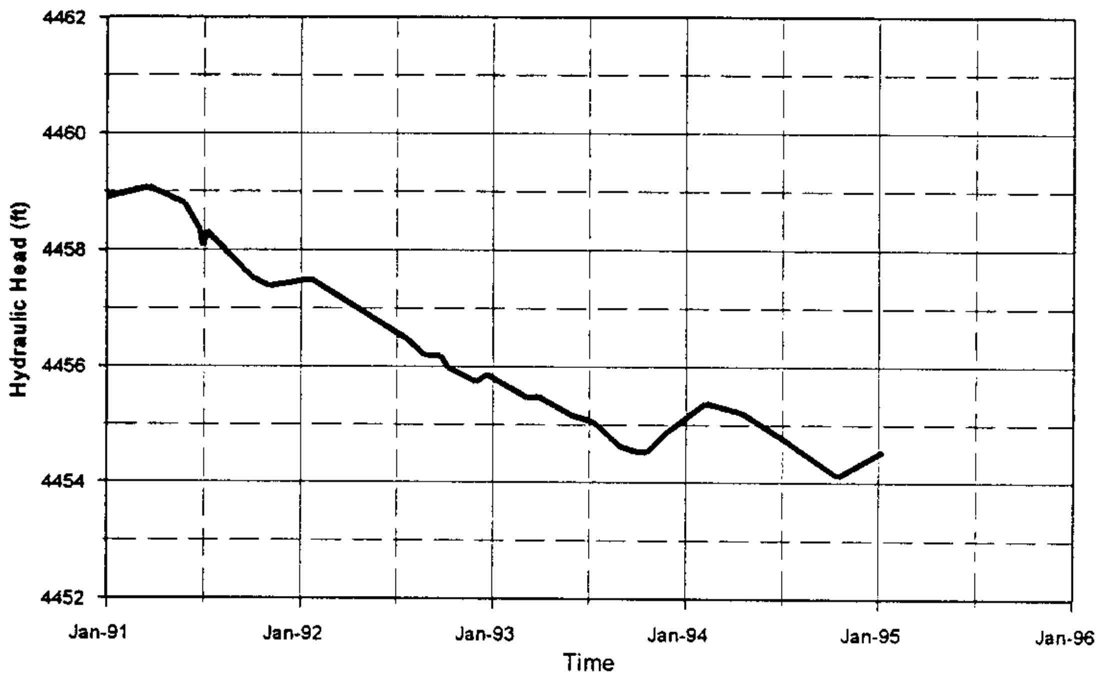


Figure 14. Head vs time for well USGS-58

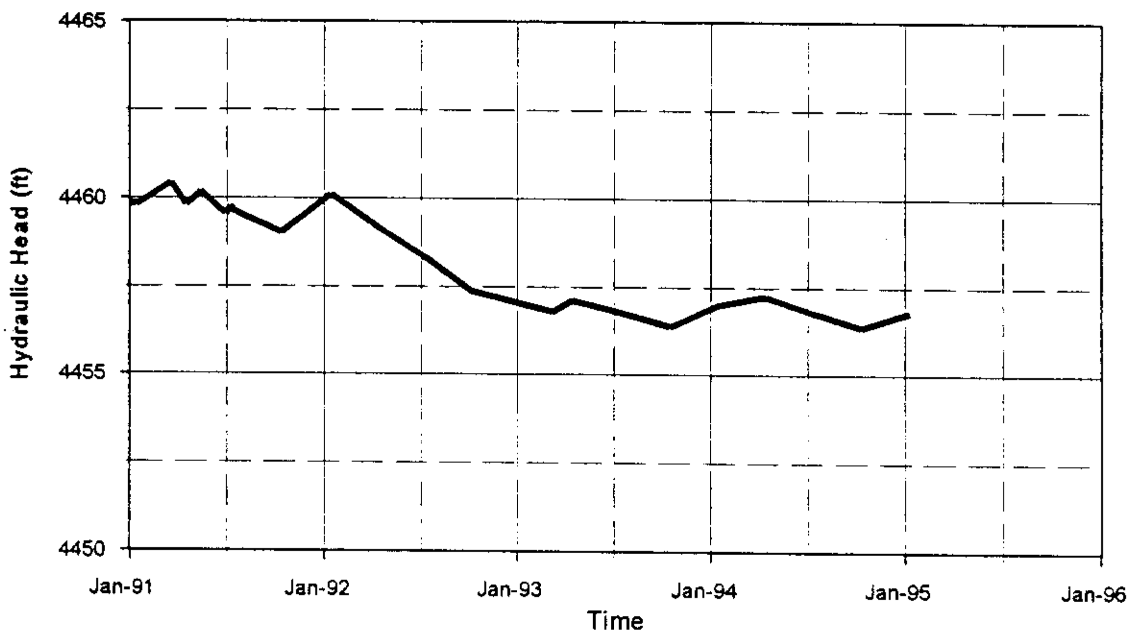


Figure 15. Head vs. time for well USGS-65

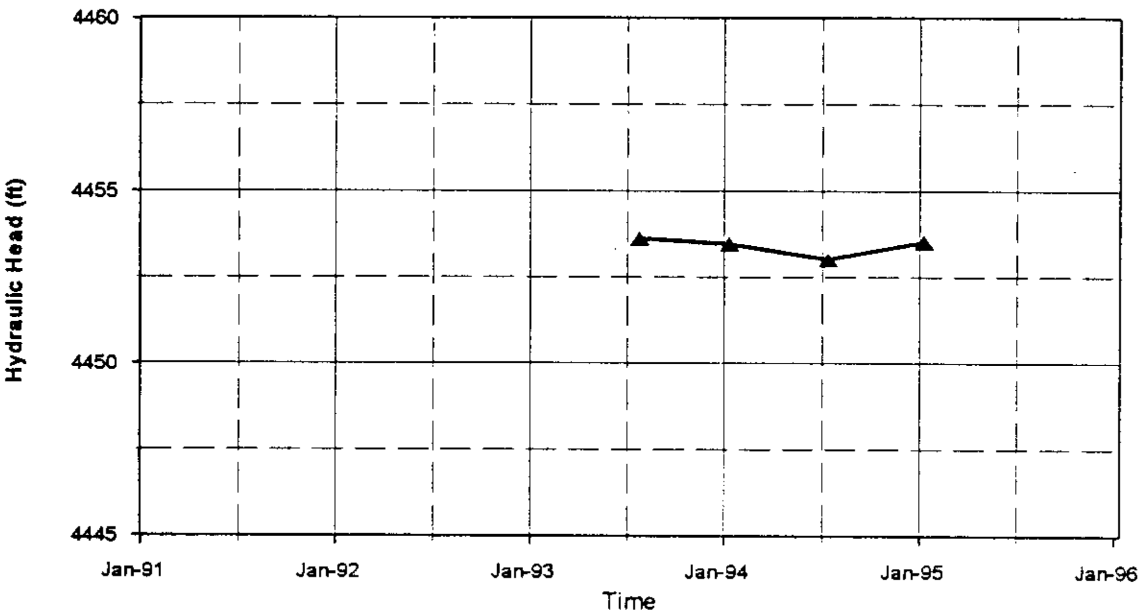


Figure 16. Head vs. time for well TRA-7

4.3 Aquifer Well Completions

Proper evaluation of aquifer well sample concentrations depends on the well completion. Aquifer well completions are presented in Table 2. Aquifer wells USGS-65 and TRA-7 in the OU 2-12 monitoring network are completed 20 to 25 feet of the aquifer. Samples from those shallow wells can be expected to provide good estimates of contaminant concentrations entering the aquifer from the DPWS. They are less valuable for providing estimates of the vertically mixed concentrations in the aquifer.

The open interval in well USGS-58 extends slightly deeper into the aquifer. Depth of the open interval is only one criteria for judging the vertical representativeness of the samples. Doornbos et al (1991) show the existence of an interbed below the open intervals in wells USGS-65 and TRA-7, whereas such an interbed is not known to exist below well USGS-58. Samples from USGS-58 may be more representative of greater vertical mixing and thus more dilute than samples from USGS-65 and TRA-7.

Aquifer wells in the USGS monitoring network that are not in the OU 2-12 monitoring network are completed deeper in the aquifer than the OU 2-12 aquifer wells. It is expected that samples collected from those wells might show diluted concentrations due to vertical mixing. The open interval in well TRA-6 begins approximately 60 feet below the water table and is representative of a zone below a sedimentary interbed in the aquifer (Doornbos et al., 1991). The bottom of the open interval in well TRA-8 is slightly deeper than the OU 2-12 wells.

Table 2. Aquifer well completions.

Well Name	Total Depth (ft)	Open Interval (ft)	Depth to Water (ft blsd)	Land Elevation (ft amsl)
MTR-TEST	588	447-588	462.2	4917.15
SITE-19	865	472.4-512.4 532.6-572.5 596.7-616.7 780.7-862.6	471.6	4926.33
TRA-6	562	528-558	~469	4927.10
TRA-7	501	463-493	477.1	4931.56
TRA-8	501.5	471.5-501.5	~474	4934.93
TRA-disp	1267	512-697 935-1070 1183-1267	468.9	4923.07
USGS-58	503	218-503	463.8	4918.37
USGS-65	498	~456-493	468.2	4925.01
USGS-76	718	457-718	476.9	4929.70
USGS-79	709	281-702	477.1	4917.15
blsd - below land surface datum amsl - above mean sea level				

4.4 Aquifer Head Contour Maps

Changes in the SRP aquifer head beneath the TRA generally reflect changes in the regional aquifer (Mundorff et al., 1964; Arnett et al., 1993; Arnett et al., 1994, McCarthy et al., 1994; Garabedian, 1989). Figure 17 is an aquifer head contour map of the aquifer in the spring of 1991, and Figure 18 is a contour map of heads in the spring of 1994. Heads from aquifer wells in the vicinity of TRA as well as other INEL aquifer wells away from TRA were used to produce Figures 17 and 18. Differences result from regional recharge patterns . The head for well USGS-65 is seen on both figures to be approximately 2 feet higher than the head pattern established by the other wells.

This finding is consistent with the results of Doornbos et al. (1991). Aquifer heads in the spring of 1995 were about 4 feet lower than the heads in the spring of 1991. This is a result of an extended period of lower regional recharge. However, contaminant transport in the aquifer is driven by the spatial change in heads or head gradient which is very similar for the two periods.

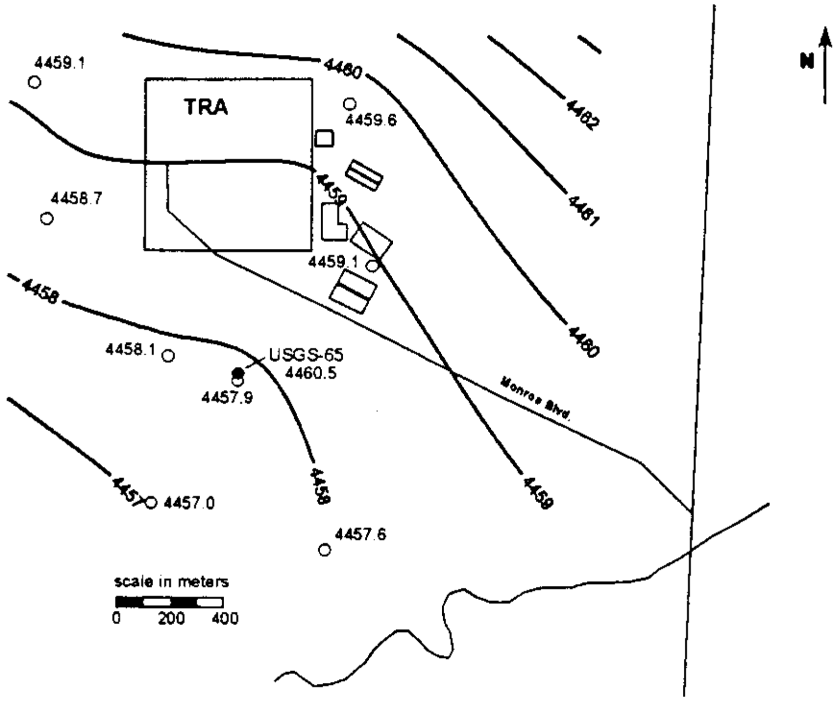


Figure 17. Aquifer head contour map - spring 1991

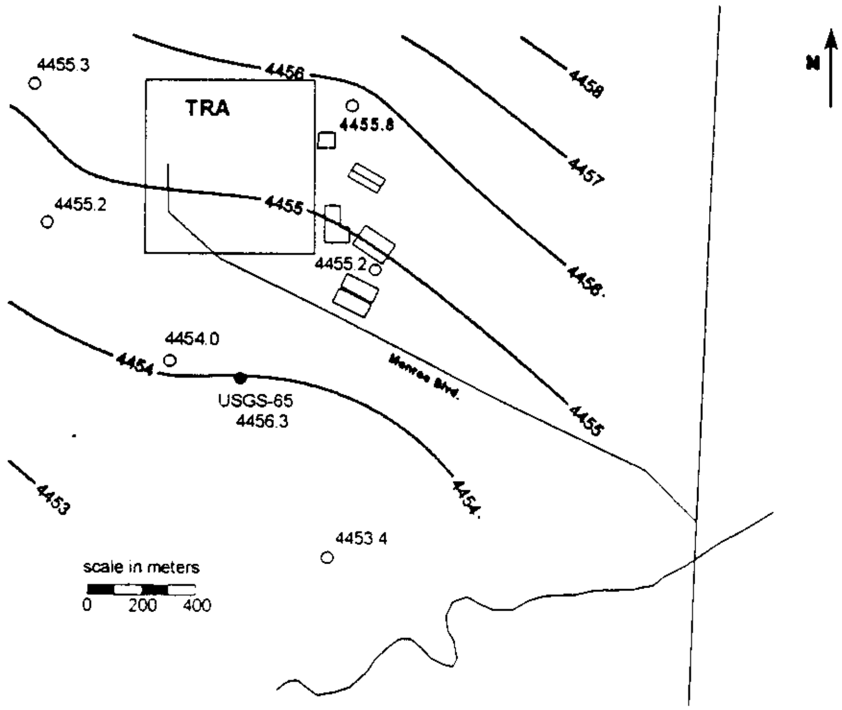


Figure 18. Aquifer head contour map - Spring 1994

Minor changes in heads in the aquifer can be expected from recharge from the Big Lost River during periods of intermittent flow. The Big Lost River flowed in the springs of 1993 and 1995 after 6 years of no-flow. It is concluded that transport conditions in the aquifer remain about the same as during the pre-ROD period.

4.5 Summary of Aquifer Head Patterns

Head patterns in the aquifer reflect regional changes in the aquifer resulting primarily from recharge patterns at the periphery of the aquifer. Heads in well USGS-65 suggest a local system where mixing with deeper parts of the aquifer is inhibited. Such a condition would also inhibit contaminant mixing and delay a reduction in contaminant concentrations in the aquifer at that well. Contaminant transport conditions in the aquifer remain about the same as they were during the immediate pre-ROD period (1991).

5. CONTAMINANT TREND ANALYSIS

In support of the project objectives stated in the monitoring plan (Dames and Moore, 1993), post-ROD monitoring results are to be used in the assessment and evaluation of water quality of the DPWS and the SRP aquifer in the vicinity of the TRA. The purpose of this section is to evaluate concentration trends with respect to calculated tolerance intervals. This is accomplished by presenting all the OU 2-12 post-ROD monitoring concentrations in Appendix C, performing tolerance limit calculations and regressions analyses on the data, plotting contaminant concentration vs. time for each contaminant and well with sufficient samples to calculate a tolerance limit, identifying trends and excursions above the tolerance limit, and noting changes from identified pre-ROD contaminant trends.

5.1 OU 2-12 Post-ROD Monitoring Results

Post-ROD monitoring results are tabulated in Appendix C for all OU 2-12 wells. The tables in Appendix C identify the various contaminants of concern for each well, along with the associated analytical results, and data qualifier flags. The data qualifier flags reflect laboratory and validator applied flags.

The post-ROD sampling dates are also shown on the Appendix C tables, along with an indication of whether the applicable sample collected was filtered or not. The initial technical memorandum addressed post-ROD data from the first four sampling rounds: July and October 1993, and January and April 1994. The tables in Appendix C include these data plus data from post-ROD sampling rounds 5 through 8: July and October 1994, and January and April 1995, respectively.

5.2 Tolerance Limit Calculations and Regression Analysis

Concentration versus time plots for contaminant of concern results from the OU 2-12 wells are presented in Appendix D. These plots present available pre- and post-ROD concentration results, along with the associated upper tolerance limit (UTL). A plot is included for each contaminant with a sufficient number of data points (i.e., at least five detected data points at the end of the first year of sampling) to calculate an UTL.

Upper tolerance limits are calculated using a one-sided tolerance factor (k) such that 95% of the observed concentrations fall within the calculated limits with a 99% confidence level. Trend determinations for each well and contaminant are based on performing a linear regression analysis. The calculated UTL and a regression line are shown on the plots in Appendix D in which the p-value associated with the statistical test of a non-zero regression line slope was less than 0.05. If no trend was found, only the UTL is shown on a plot.

In accordance with the monitoring plan, historical data (i.e., pre-ROD data), with outliers removed, and data from the first year of post-ROD sampling were used to recalculate the upper tolerance limits and to make the trend determinations. For the purposes of this study, historical outliers were defined as those pre-ROD data values that exceeded the initial upper tolerance limits calculated from the pre-ROD data. Trend determinations and UTL calculations are to be updated annually incorporating results from each new year of sampling, as defined in the monitoring plan.

For the post-ROD sampling events, if a concentration was found to be less than the instrument detection limit (i.e., there was an associated qualifier flag of 'U'), then an adjustment was made to the value. In these instances, the value was set at half of the instrument detection limit. These values are considered to be the best estimate of the true value and, as such, are used in the linear regression, the UTL calculations, and are charted on the concentration versus time plots in Appendix D. For metals, only filtered metals data from the post-ROD sampling events were used in the linear regression and UTL calculations since available pre-ROD data were assumed to be filtered.

5.3 Trend Determinations and Excursion Summary

For each OU 2-12 well, trend determinations and post-ROD excursions are identified in accordance with guidance presented in the monitoring plan. Excursions are defined as an exceedance of an applicable UTL. As stated in the monitoring plan, concentrations falling within the tolerance limits will be assumed to be normal and will require no contingency actions. For comparison purposes, where baseline UTLs from pre-ROD data were calculated, any post-ROD excursions are also identified.

No discussions are provided for wells PW-11, PW-12, or TRA-7 since insufficient data existed at the end of the first year of post-ROD sampling to make trend determinations or to calculate UTLs for these wells. Data for these wells will be reassessed prior to Round 9 and trend determinations and UTL calculations will be addressed in future technical memoranda.

5.3.1 Deep Perched Well USGS-53

Decreasing concentration trends were observed for arsenic and tritium. For arsenic, the trend determination is based solely on data from the first year of post-ROD sampling (four rounds with one duplicate). For tritium, the trend determination is based on pre-ROD data plus data from the first year of post-ROD sampling. No significant trends were observed for any other USGS-53 contaminants.

For arsenic, data from the second year of post-ROD monitoring exceeded the associated UTLs. These UTLs are based solely on the first year of post-ROD monitoring. The Round 8 result for chromium exceeded both the recalculated and baseline UTLs. There were no other UTL excursions for any of the other USGS-53 contaminants.

5.3.2 Deep Perched Well USGS-54

Six contaminants from USGS-54 had sufficient data to determine trends and to calculate UTLs. Of these, a decreasing concentration trend was observed for chromium. No significant trends were observed for arsenic, hexavalent chromium, fluoride, strontium-90, or tritium.

There have been no post-ROD excursions above the UTLs for any of the USGS-54 contaminants.

5.3.3 Deep Perched Well USGS-55

No significant trends were observed for arsenic, fluoride, strontium-90, or tritium, while a decreasing concentration trend was observed for chromium.

There have been no post-ROD excursions above the UTLs for any of the USGS-55 contaminants.

5.3.4 Deep Perched Well USGS-56

For USGS-56, sufficient data existed for chromium and tritium to determine trends and to calculate UTLs. A decreasing concentration trend was observed for tritium; no significant trend was observed for chromium.

There have been no post-ROD excursions above the UTLs for this well.

5.3.5 Aquifer Well USGS-58

An increasing trend was observed for tritium in USGS-58. Insufficient data were available at the end of the first year of post-ROD sampling to determine trends for the other contaminants.

There have been no post-ROD excursions above the UTLs for any of the USGS-58 contaminants.

5.3.6 Aquifer Well USGS-65

Chromium and tritium had sufficient data to determine trends; decreasing trends were observed for both contaminants.

The Round 7 tritium result exceeded the recalculated UTL. No other post-ROD excursions were observed for any of the USGS-65 contaminants.

5.4 Changes from Identified Pre-ROD Contaminant Trends

Pre-ROD data are available for chromium and tritium for some of the OU 2-12 wells. For these wells, pre-ROD contaminant trends were identified prior to the start of post-ROD monitoring and were discussed in the initial technical memorandum (Jessmore, 1994). Table 3 summarizes these contaminant trends and presents the associated contaminant trends determined after the first year of post-ROD sampling, with any deviations from the pre-ROD contaminant trends italicized.

Only two deviations were noted between the pre-ROD and initial post-ROD trends. A significant decreasing trend was observed for chromium in USGS-55 when historical and the first year of post-ROD data were considered. For tritium in USGS-58, an increasing trend was observed when the first year of post-ROD data and the historical data (with one extreme point removed) were considered.

Table 3. Deviations in contaminant trends

Well Identifier	Contaminant	Observed Trend	
		From pre-ROD data only	From pre-ROD and First year post-ROD data
USGS-53	Chromium	None	None
	Tritium	Decreasing	Decreasing
USGS-54	Chromium	Decreasing	Decreasing
	Tritium	None	None
USGS-55	Chromium	None	*Decreasing*
	Tritium	None	None
USGS-56	Chromium	None	None
	Tritium	Decreasing	Decreasing
USGS-58	Chromium	None	None
	Tritium	None	*Increasing*
USGS-65	Chromium	Decreasing	Decreasing
	Tritium	Decreasing	Decreasing

Italics indicate deviations from the pre-ROD trends

6. PERCHED WATER CONTAMINANT AREAL PLOTS

The purpose of this section is to graphically present and evaluate important areal changes in the concentrations of selected contaminants over time in the DPWS using both OU 2-12 and USGS data. It is intended to be complementary to the statistical trend analysis presented in the previous section. Several techniques for presenting the areal distributions of contaminants were considered, including contour mapping and bubble graphs. There are limited data and large differences in concentrations between wells and in some cases large changes in concentrations in the same well over several sampling periods. These conditions contributed to the selection of the bubble graph technique wherein a filled circle or "bubble" is plotted at the well location. The area of the bubble is proportional to the concentration of the specified contaminant at the well. Bubble graphs are an easy and convenient method of graphically displaying significant changes in areal distributions of contaminant concentrations. The bubble graph method also allowed more periods of data to be displayed without the considerable subjective interpretation that a contour map would have required.

6.1 Key Contaminants

The key contaminants in terms of significant measured and predicted concentrations in the aquifer are tritium and total chromium.

6.2 USGS Contaminant Data

USGS contaminant data are available from the beginning of record for the perched and aquifer wells. Contaminant concentration data collected by the USGS for the selected contaminants from 1991 to late 1994 are presented to supplement the data collected under the OU 2-12 monitoring program.

6.3 Current Plume Status

Bubble graphs of tritium concentration in the DPWS at OU 2-12 and USGS network wells are presented in Figures 19 through 21 for spring 1991, 1994, and 1995, respectively. Only OU 2-12 data are available for April 1995. Concentrations decreased slightly or remained fairly constant in all wells from 1991 to 1995. Tritium concentrations in aquifer wells for the same periods are presented in Figures 22 through 24, respectively. Tritium concentrations appear to be decreasing in most USGS and OU 2-12 monitored wells. There is a trend of increasing tritium concentrations in well USGS-58, but the highest concentration is small compared to the Federal Public Drinking Water Standard published in 40 CFR 141.11. There were insufficient data to perform a trend analysis with data from well TRA-7. The bubble graphs show an increased concentration from 1991 to 1994 followed by a decrease in 1995.

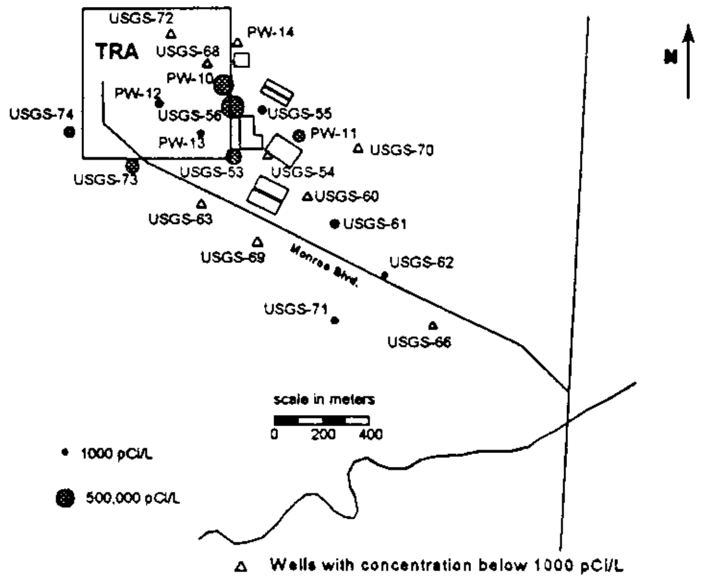


Figure 19. Tritium concentrations in DPWS wells for winter 1991 (SI data)

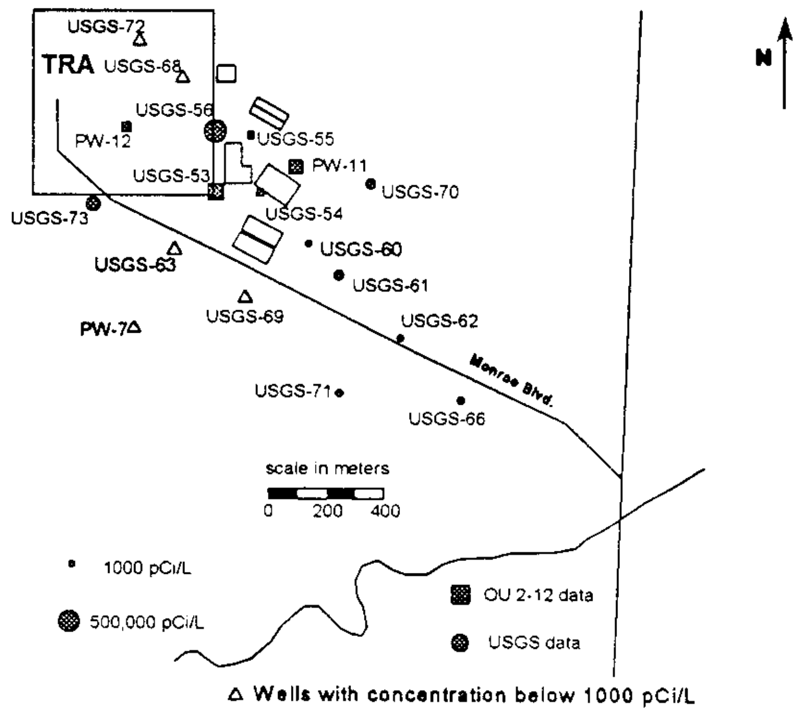


Figure 20. Tritium concentrations in DPWS wells for spring 1994

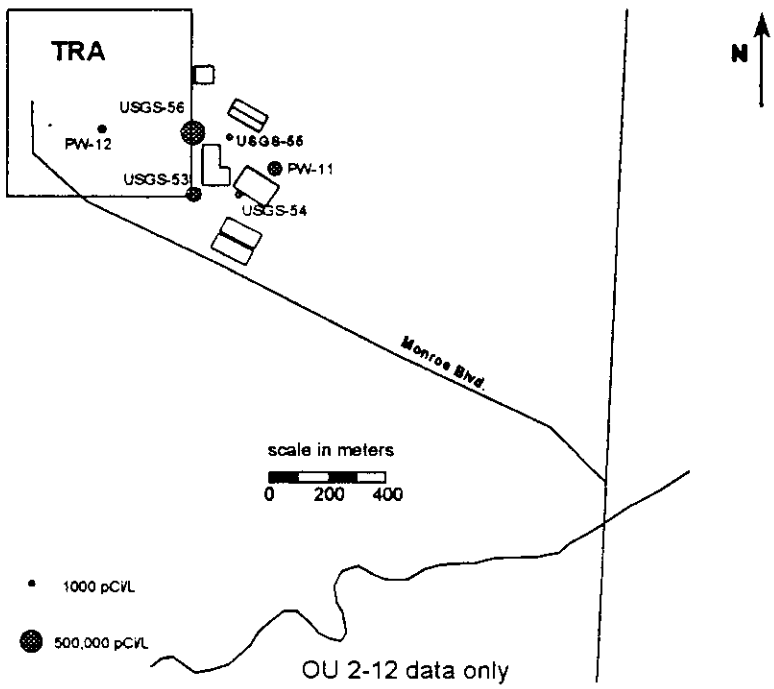


Figure 21. Tritium concentrations for DPWS wells for spring 1995

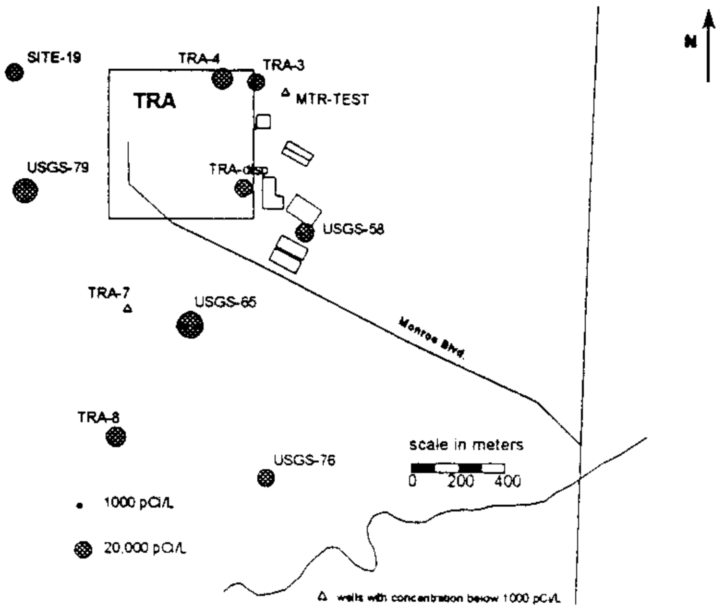


Figure 22. Tritium concentrations in aquifer wells for spring 1991

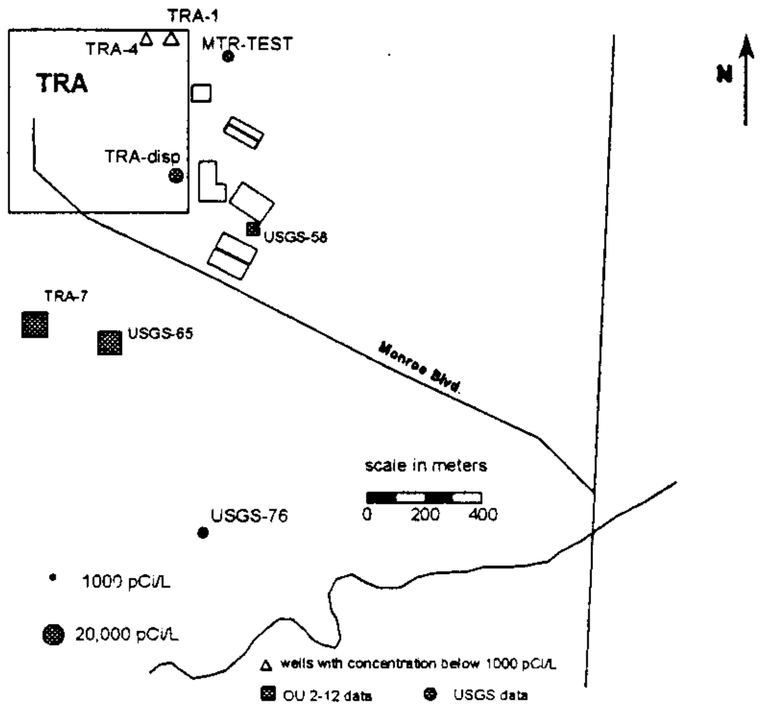


Figure 23. Tritium concentrations in aquifer wells for spring/summer 1994

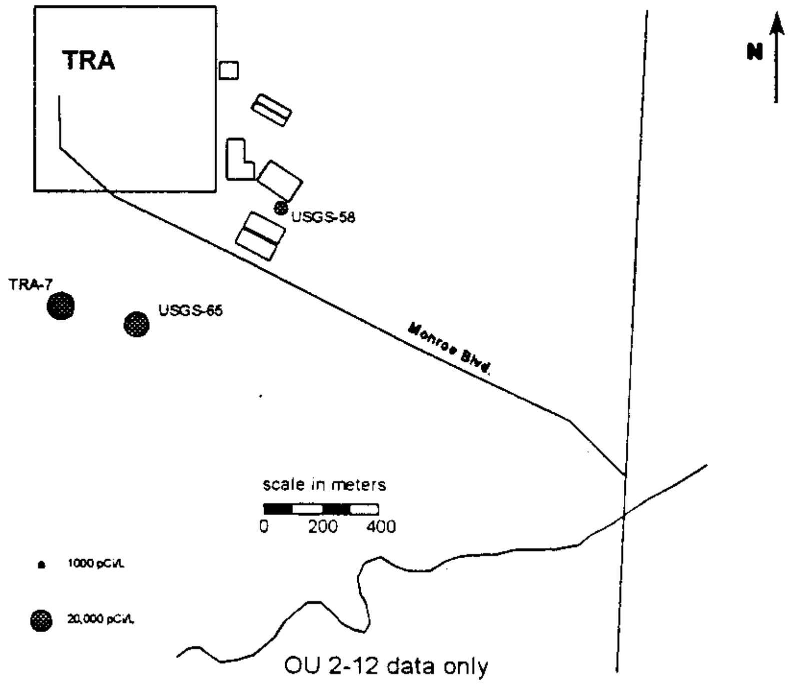


Figure 24. Tritium concentrations in aquifer wells for winter 1995.

Chromium concentrations in the DPWS are presented in Figures 25 through 27 for the springs of 1991, 1994, and 1995, respectively, and for the aquifer during the same periods in Figures 28 through 30. Based on these 3 data points, concentrations also decreased slightly or were essentially unchanged in all wells except well USGS-53 where a slight increase was observed. On Figure 26, USGS concentration data was used for the spring/summer of 1994 for USGS-53 rather than the OU 2-12 value because it was higher and the samples were taken a few days apart. The statistical analysis on pre- and post-ROD OU 2-12 data determined that no significant trend exists. However, the April 1995 data point represented an excursion above the tolerance limit. It is noted that well USGS-53 was used intermittently in the early 1960s as a disposal well for cooling water blow-down which included chromates (Doornbos et al. 1991). It appears that chromium from that period continues to desorb. Recently lowered water flow rates may contribute to higher concentrations. Future data may help clarify the status of chromium at well USGS-53.

Chromium concentrations in the aquifer show a pattern of little change or decreasing concentrations. Concentrations in well TRA-7 show a similar pattern to those in USGS-65. Chromium concentrations in well USGS-58 are much smaller and well below the FPDWS.

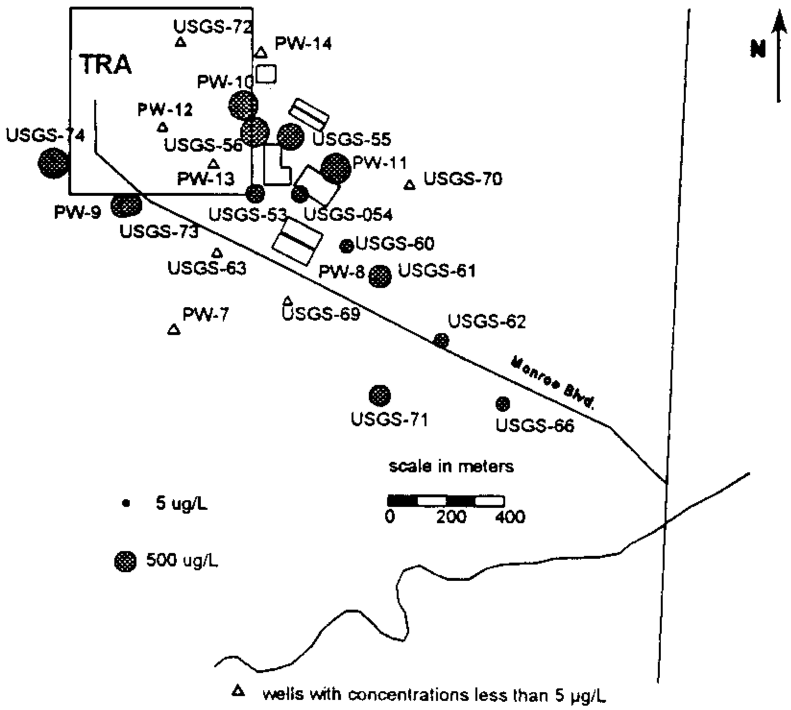


Figure 25. Chromium concentrations for DPWS wells for spring 1991

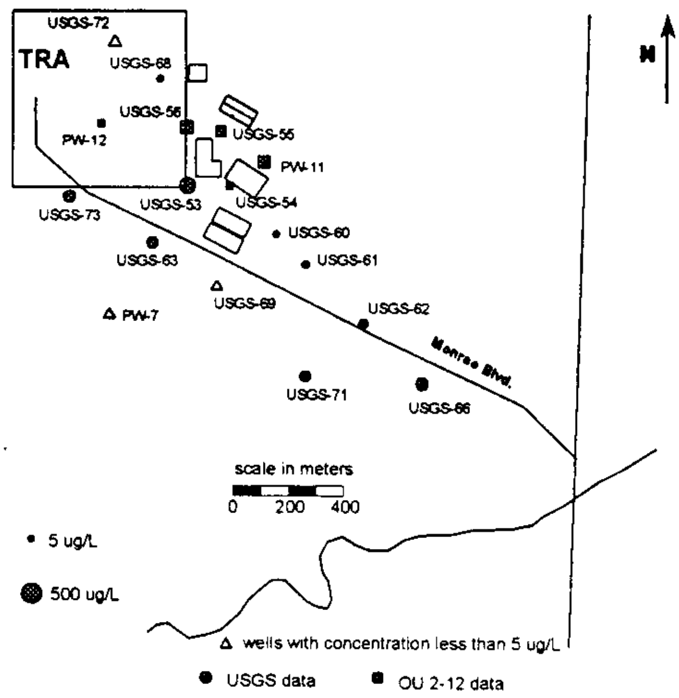


Figure 26. Chromium concentrations for DPWS wells for spring/summer 1994

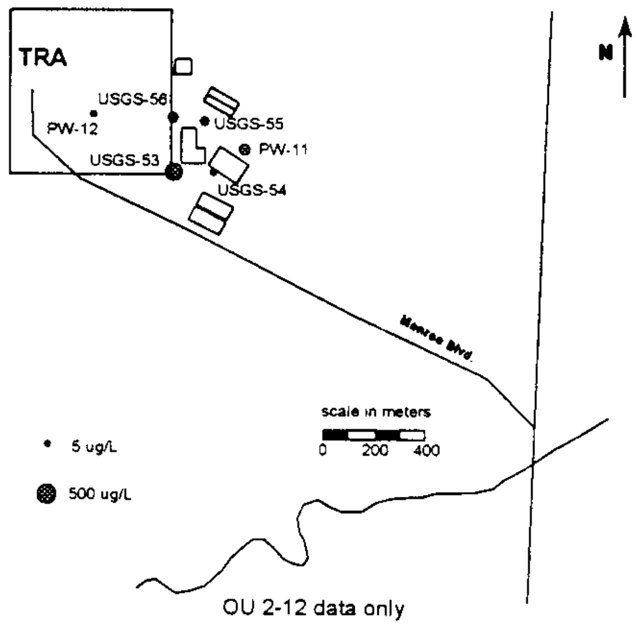


Figure 27. Chromium concentrations for DPWS wells for spring 1995

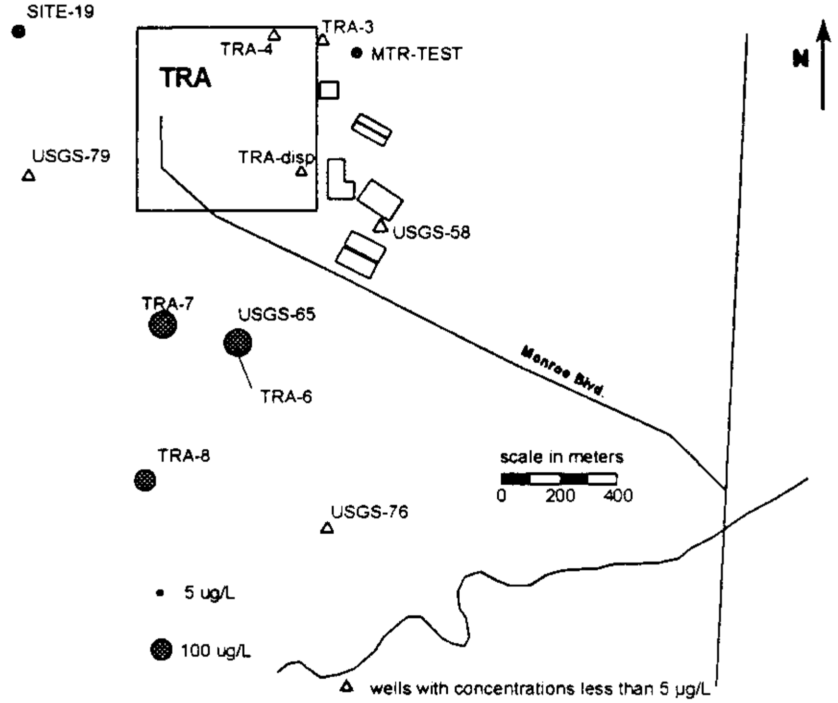


Figure 28. Chromium concentrations in aquifer wells for spring 1991

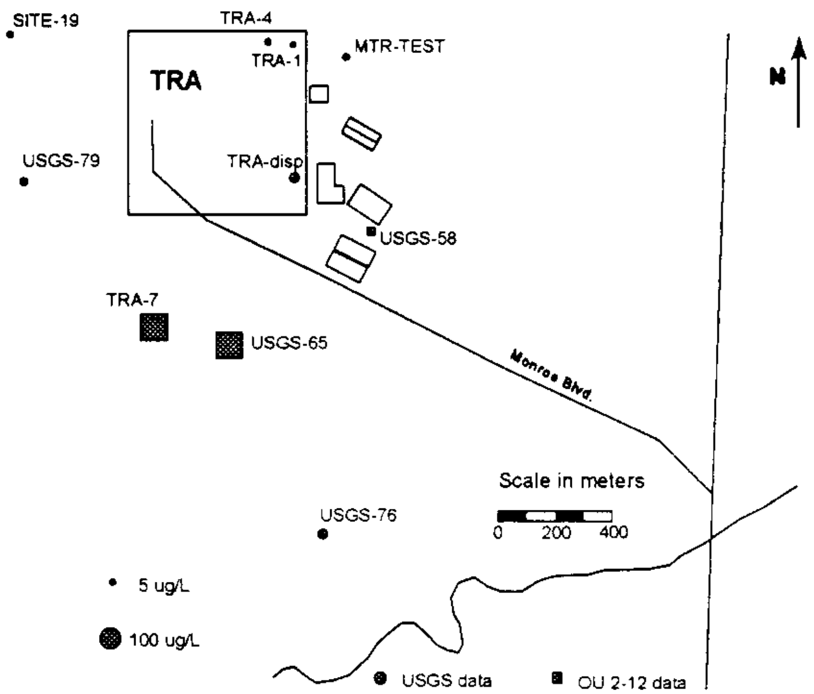


Figure 29. Chromium concentrations in aquifer wells for spring-summer 1994

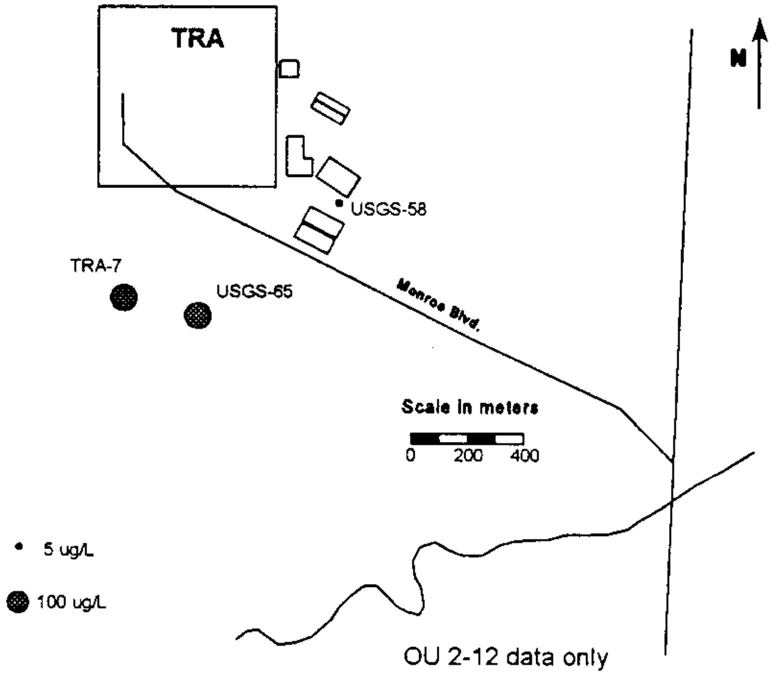


Figure 30. Chromium concentrations in aquifer wells for winter 1995

6.4 Changes Attributable to Warm Waste Pond Discontinuance

As shown in the bubble graphs, tritium concentrations have decreased slightly or remained essentially unchanged in most wells since 1991. DPWS well concentrations in the immediate vicinity of the CWP are low suggesting that tritium flushing is near completion in that area. Northwest of the CWP, tritium concentrations in the DPWS are slowly declining or essentially unchanged. This suggests that flushing in this area since discontinuance of the Warm Waste Ponds is slow due in to the different hydraulic regime. Chromium concentrations have decreased in most DPWS wells except for well USGS-53. Failure of chromium to decline in well USGS-53 may be due to delayed desorption. Discontinuance of the Warm Waste Ponds appears to have caused a reduction in concentrations in most, but not all DPWS wells. Concentrations of tritium and chromium remain high in several aquifer wells and; discontunuance of the Warm Waste Ponds does not yet appear to have affected the aquifer wells.

7. COMPARISON OF DATA TO PREDICTED TRENDS

The driving issue for the analysis of the DPWS was the potential for future contamination of the aquifer beneath the TRA. The finding of no-action for OU 2-12 was the expectation of no adverse effects on the SRP aquifer. Expected changes in aquifer contaminant concentrations are based on the fate and transport computer model predictions presented in the OU 2-12 RI/FS (Lewis et al. 1992). Expected changes in contaminant concentrations in the SRP aquifer are summarized as bulleted items below followed by a description of the actual changes observed during the first 2 years of the post-ROD monitoring.

- Americium-241 concentrations were expected to remain below detection.

  Americium-241 followed the expected near-term change. All SRP aquifer samples had Americium-241 concentrations below detection limits during the first 2 years of monitoring.

- Arsenic concentrations were expected to remain below detection.

  Arsenic followed the expected near-term change. All SRP aquifer samples had arsenic concentrations below detection limits during the first 2 years of monitoring.

- Beryllium concentrations were expected to remain below detection.

  Beryllium followed the expected near-term change. All SRP aquifer samples had beryllium concentrations below detection limits during the first 2 years of monitoring.

- Cadmium concentrations may increase and then rapidly decline.

  The cadmium detection limit was exceeded in one sample the first year (round 3). During the first 2 years of monitoring, cadmium concentrations in all other samples were below the detection limit in the aquifer wells. The round 3 sample had a cadmium concentration of 2.5 μg/L. This value is below the Federal Primary Drinking Water Standard (FPDWS) of 5 μg/L listed in 40 CFR 141.11, but exceeds the background of <1 μg/L for the SRP aquifer (Orr et al. 1991).

- Cesium-137 concentrations were expected to remain below detection.

  Cesium-137 followed the expected near-term change. All SRP aquifer samples had cesium-137 concentrations below detection limits during the first 2 years of monitoring.

- Chromium concentrations were expected to continue to decrease.

  During the first 2 years of monitoring, the range of chromium concentrations in filtered samples was 186 to 201 μg/L for well TRA-7, undetected to 12 μg/L for well USGS-058, and 163 to 187 μg/L for well USGS-65. Chromium concentrations in unfiltered samples ranged from 204 to 321 μg/L in TRA-7, undetected to 9 μg/L in USGS-58, and 159 to 183 μg/L in USGS-65. Insufficient data existed at the end of the first two years of monitoring to calculate a UTL for well TRA-7. Based on historical data, a decreasing trend continues in well USGS-65 while no significant trend is seen in well USGS-58. Chromium concentrations in TRA-7 and USGS-65 continue to exceed the FPDWS of 100 μg/L listed in 40 CFR 141.11. All chromium concentration values for wells TRA-7 and USGS-65 and several values for USGS-58 exceed the INEL vicinity SRP aquifer background of 2 to 3 μg/L (Orr et al. 1991).

- Cobalt-60 concentrations may increase and then decrease.

  Based on no detection of total gamma radiation in the aquifer wells samples, it was concluded that all Co-60 concentrations were below detection limit. This is a variance from expected conditions where the model indicated a possible near-term increase.

- Fluoride concentrations were expected to remain below detection.

  Fluoride concentrations ranged from 170 to 180 μg/L at well TRA-7, from 130 to 140 μg/L in USGS-58, and 150 to 170 μg/L in USGS-65. These concentrations are well below the FPDWS of 4,000 μg/L listed in 40 CFR 141.111, and are below the INEL vicinity background of 400 to 500 observed in the SRP aquifer (Orr et al. 1991).

- Lead concentrations were expected to remain below detection.

  Concentrations of lead in aquifer samples obtained during the second year of monitoring were all below the detection limit except for one value of 3.3 μg/L from well USGS-65. Several samples had concentrations above the detection limit ranging from 1.2 to 5.6 μg/L during the first year of monitoring. These concentrations are all well below the FPDWS of 50 μg/L listed in 40 CFR 141.11, and with one exception are below the background established for the SRP aquifer in the vicinity of the INEL of <5 μg/L (Orr et al. 1991).

- Manganese concentrations were expected to remain below detection.

  Concentrations of manganese continue to be below detection limit for well USGS-58. Concentrations of manganese in well TRA-7 ranged from undetected to 3.8 μg/L for filtered samples and undetected to 8.2 μg/L for unfiltered samples during the second year of monitoring. This compares to a range of undetected to 4 μg/L for filtered samples and a range of 7 to 15 μg/L for unfiltered samples for the first year of monitoring. One sample from well TRA-65 had a concentration of 3 μg/L that exceeded the detection limit during the first 2 years of monitoring (round 3). These concentrations are well below the FPDWS of 50 μg/L listed in 40 CFR 141.11. Background concentrations for manganese in the SRP aquifer in the vicinity of the INEL have not been established, so a comparison with background is not possible.

- Strontium-90 concentrations might increase and then decrease.

  Strontium-90 concentrations of all samples collected from SRP aquifer wells during the first 2 years of monitoring were below the detection limit.

- Tritium concentrations were expected to continue to decrease.

  Tritium concentrations during the first 2 years of monitoring ranged from 30.3 to 37.6 pCi/mL at well TRA-7, from 4.2 to 5.59 pCi/mL at well USGS-58, and 24.8 to 28.6 at well USGS-65. Tritium concentrations in wells TRA-7 and USGS-65 remain above the FPDWS of 20 pCi/mL listed in 40 CFR 141.11. The range of tritium concentrations in

USGS-58 is well below the FPDWS but above the aquifer background of 0.075 to 0.15 pCi/mL in the INEL vicinity (Orr et al. 1991). A slight upward trend has been statistically determined for tritium in well USGS-58 and a downward trend determined for tritium concentrations in well USGS-65.

8. ASSESSMENT OF PREDICTIVE MODELING ASSUMPTIONS

The remedial investigation for the TRA perched water system (OU 2-12) included the development and application of a perched water/aquifer flow and contaminant transport model. The model is described and the results are presented in Chapter 5 of Lewis, et al. (1992). The model was calibrated with existing head and contaminant data available in 1991. Calibration was based on the degree to which the model could simulate historic water levels and concentrations of tritium and chromium in the DPWS and the SRP aquifer. Because the model was a simplification of the DPWS, a perfect match between the model and the observed data was not possible. The primary goals sought in calibrating the model were to:

- Obtain a good match between the observed and simulated initial breakthrough of tritium and chromium in the DPWS and the SRP aquifer wells
- Obtain a good match between the observed and simulated concentrations of tritium and chrcmium in the DPWS and aquifer wells.

The match between simulated and observed water levels was considered to be of secondary importance. Simulated concentrations that were within an order of magnitude of the observed concentrations were considered adequate. The calibration of the model was qualitative. Lewis et al. (1992) considered well USGS-65 to be the only well in the SRP aquifer that provided representative contaminant concentrations with the longest record of information for model calibration. Contaminant data through 1990 were used in the model calibration.

After calibration, the model was used to simulate contaminant concentrations in the aquifer from 1952 to 2115. Since the model predictions by Lewis et al., 5 years of data have been collected by the USGS, and 2 years of post-ROD data have been collected under the OU 2-12 monitoring program. It is appropriate to compare the model predictions with recent data and to briefly reevaluate the model assumptions and uncertainties, particularly as they may relate to deviations of observed values from model predictions.

Before proceeding with the comparisons and model evaluation, it is important to review the purpose and objectives of the modeling. The general purpose of the modeling was to provide predictions of contaminant concentrations in the SRP aquifer that could be used to estimate future human health and ecological risks associated with TRA waste water releases to the ground. The general objective of the modeling was to estimate future conditions in a reasonably realistic manner where possible and in a conservative manner where required by uncertainty. Data availability was the major constraint influencing the modeling approach and assumptions.

Lewis et al. (1992) describe the model. It is a two-dimensional cross-sectional model oriented northeast to southwest in the direction of the aquifer flow. Model position and orientation are shown on Figure 31. They also present a list of modeling factors that contribute to model uncertainty. Among those factors are several that deserve mention here as contributing to the minor to moderate deviations between predicted and observed results over the past several years. Those factors are:

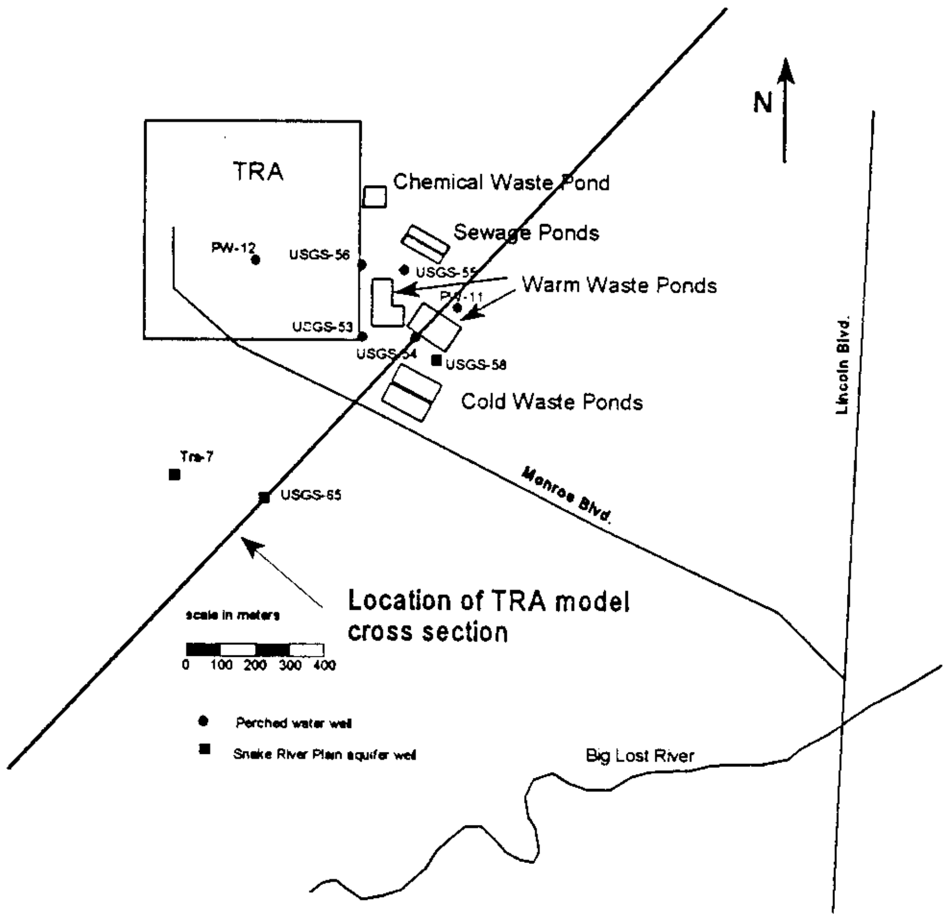


Figure 31. Location and orientation of the RI/FS predictive cross-section model

- The model does not account for flow and transport perpendicular to the two-dimensional, vertical cross-section aligned parallel to the aquifer flow direction

- The model does not account for all the heterogeneity which may affect flow and transport

- The model does not account for the shallow perched system which may cause mixing and lateral spreading of the water and contamination

- The average sorption coefficient for chromium may be too conservative (low) in the sedimentary interbeds

- The vertical conductivity in the model for the interbed beneath the DPWS may be too high.

The two-dimensionality, limited heterogeneity, and lack of a shallow perched water system assumptions were identified by Lewis et al. (1992) as factors that contributed to deviations of the simulated and observed chromium concentrations during model calibration. They observed that increased chromium concentrations after 1982 in several wells may be the result of flushing sorbed chromium with water from the CWP or natural areal infiltration. They stated that the "model does not account for this flushing by cold waste pond water because the model does not account for the mixing that occurs in the shallow perched zone."

In addition to the observations by Lewis et al., it appears that spreading transverse to the model cross-section is somewhat more important than suggested by Lewis et al. The long axis of the DPWS extends approximately 1,200 m perpendicular to the model cross-section. There has been considerable spreading and mixing within the DPWS transverse to the two-dimensional model slice. Simulated heads in the DPWS by the calibrated model were consistently and significantly lower than observed heads. This suggests that the hydraulic conductivity in the layer beneath the DPWS is lower than that used in the model. A lower conductivity would also promote the lateral spreading .

Post-ROD chromium concentrations are not yet consistently decreasing in the aquifer as suggested by the model. There have been some increased chromium concentrations in DPWS well USGS-53 during the post-ROD period and decreasing trends are not currently seen for all aquifer wells (see chromium vs. time plots in Appendix D.) This suggests that the original average sorption coefficient for chromium used in the model may have been low (conservative) and that sorbed chromium continues to be released. A low average sorption coefficient in the model would be conservative from the viewpoint of a more rapid release to the aquifer and higher predicted concentrations and risk during early periods. Lower water flow rates in the recent past may have contributed to higher concentrations even though the mass release rate of chromium remains constant.

In spite of these limitations which were recognized at the time of model development and application, the model did achieve its objective of being a useful simulator of flow and contaminant transport from the ponds through the DPWS to the SRP aquifer and a conservative predictor of overall risk.

9. EVALUATION OF THE OU 2-12 GROUNDWATER MONITORING

There is a commitment in the OU 2-12 monitoring plan to evaluate the sampling frequency and well selection after a period of monitoring. Significant changes in water levels and contaminant concentrations should be captured. The data obtained from the OU 2-12 plan is compared to data from USGS monitoring to see if significant trends would be better represented by modifying the list of sampled wells or sampling frequency.

9.1 Adequacy of Well Selection

In general, the OU 2-12 monitoring network is functioning as intended and appears to have captured the changes in contaminant concentration both areally and temporally. It is useful to continue to supplement the OU 2-12 data with USGS data as was done for this memorandum. The selection of wells for monitoring the DPWS should remain unchanged. As previously noted, the concentrations of tritium and chromium in both wells USGS-65 and TRA-7 continue to exceed the FPDWS. Well TRA-8 lies down gradient of both TRA-7 and USGS-65 and has not been monitored since 1991. It is recommend that well TRA-8 be sampled for at least one round to determine the effects of mixing and transport in the aquifer. If the contaminant concentrations are undetected or very low, it would suggest that the values at TRA-7 and USGS-65 are localized and the aquifer downstream of TRA is not contaminated. If significant concentrations appear in TRA-8, monitoring should continue.

9.2 Adequacy of Sampling Frequency

The slowly changing concentrations in the DPWS wells suggest that a semi-annual sampling frequency would allow an adequate evaluation of the effect of discontinuation of radioactive discharges to surface ponds. If the sampling frequency of the DPWS wells is changed to semi-annually, it is recommended that sampling frequency of well USGS-53 remain quarterly. Continued quarterly sampling of USGS-53 is needed due to the post-ROD reported concentrations and recent excursion of chromium, which is considered an indicator contaminant. It may also be useful to review the concentration data from selected wells in the shallow perched zone near USGS-53 if chromium concentration values remain higher than expected. The concentrations in some wells are not declining as expected, suggesting that the monitoring period may need to be extended. The WAG 2 comprehensive RI/FS will be the mechanism for determining the need for monitoring and data evaluation beyond the 3-year OU 2-12 post-ROD monitoring.

10. SUMMARY AND RECOMMENDATIONS

Two years of post-ROD sampling have been completed for the TRA deep perched water system under OU 2-12. Expectations of contaminant concentration patterns outlined in the OU 2-12 RI have been met in most cases. In some cases, expected declines in tritium or chromium concentrations have not yet occurred as expected. It is recommenced that aquifer well TRA-8 be sampled for at least one round and the frequency of sampling be reduced to semi-annually for all deep perched water system wells except for well USGS-53 which has shown some recent increases in chromium concentration.

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Appendix A - OU 2-12 Groundwater Level And Elevation Data

Depth to water data and groundwater elevations or heads above mean sea level are also be presented to show changes in the hydraulic driving force.

OU 2-12 Depths to Water and Heads

Well Name pw-11

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/22/93	1111	109.33	4,809.08
10/20/93	1055	107.70	4,810.71
1/11/94	1426	106.62	4,811.79
4/4/94	1611	107.89	4,810.52
7/11/94	1505	107.90	4,810.51
10/10/94	1354	107.48	4,810.93
1/5/95	1456	108.31	4,810.10
4/7/95		112.04	4,806.37

Well Name pw-12

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/28/93	1021	83.53	4,841.95
10/19/93	1258	81.32	4,844.16
1/6/94	830	81.97	4,843.51
4/5/94	1259	84.74	4,840.74
7/12/94	1214	85.66	4,839.82
10/11/94	1047	79.50	4,845.98
1/5/95	1058	82.85	4,842.63
4/10/95	1004	79.08	4,846.40

Well Name tra-07

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/27/93	1418	480.16	4,454.56
1/10/94	1348	480.32	4,454.40
7/14/94	942	480.76	4,453.96
1/9/95	1259	480.27	4,454.45

Well Name usgs-053

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/21/93	1412	67.64	4,856.10
10/19/93	1639	60.14	4,863.77
1/7/94	1005	72.04	4,851.87
4/4/94	1429	72.91	4,851.00
7/11/94	1336	69.91	4,854.00
10/10/94	1145	72.58	4,851.33
1/5/95	1236	74.22	4,849.69

OU 2-12 Depths to Water and Heads

Well Name usgs-054

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/21/93	1544	64.05	4,858.39
10/19/93	949	56.68	4,865.93
1/11/94	1056	68.93	4,853.68
4/5/94	950	68.03	4,854.58
7/12/94	956	64.03	4,858.58
10/10/94	1217	68.72	4,853.89
1/5/95	1411	72.56	4,850.05
4/10/95	858	71.04	4,851.57

Well Name usgs-055

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/22/93	941	62.43	4,858.27
10/20/93	1151	59.08	4,861.79
1/12/94	1047	65.58	4,855.29
4/4/94	1518	65.99	4,854.88
7/11/94	1052	64.23	4,856.64
10/10/94	1420	64.42	4,856.45
1/5/95	1053	67.61	4,853.26

Well Name usgs-056

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/27/93	1107	63.45	4,859.54
10/18/93	1423	63.38	4,859.78
1/12/94	945	68.29	4,854.87
4/4/94	1300	69.13	4,854.03
7/11/94	1232	67.38	4,855.78
10/10/94	1058	67.48	4,855.68
1/5/95	1321	69.69	4,853.47

Well Name usgs-058

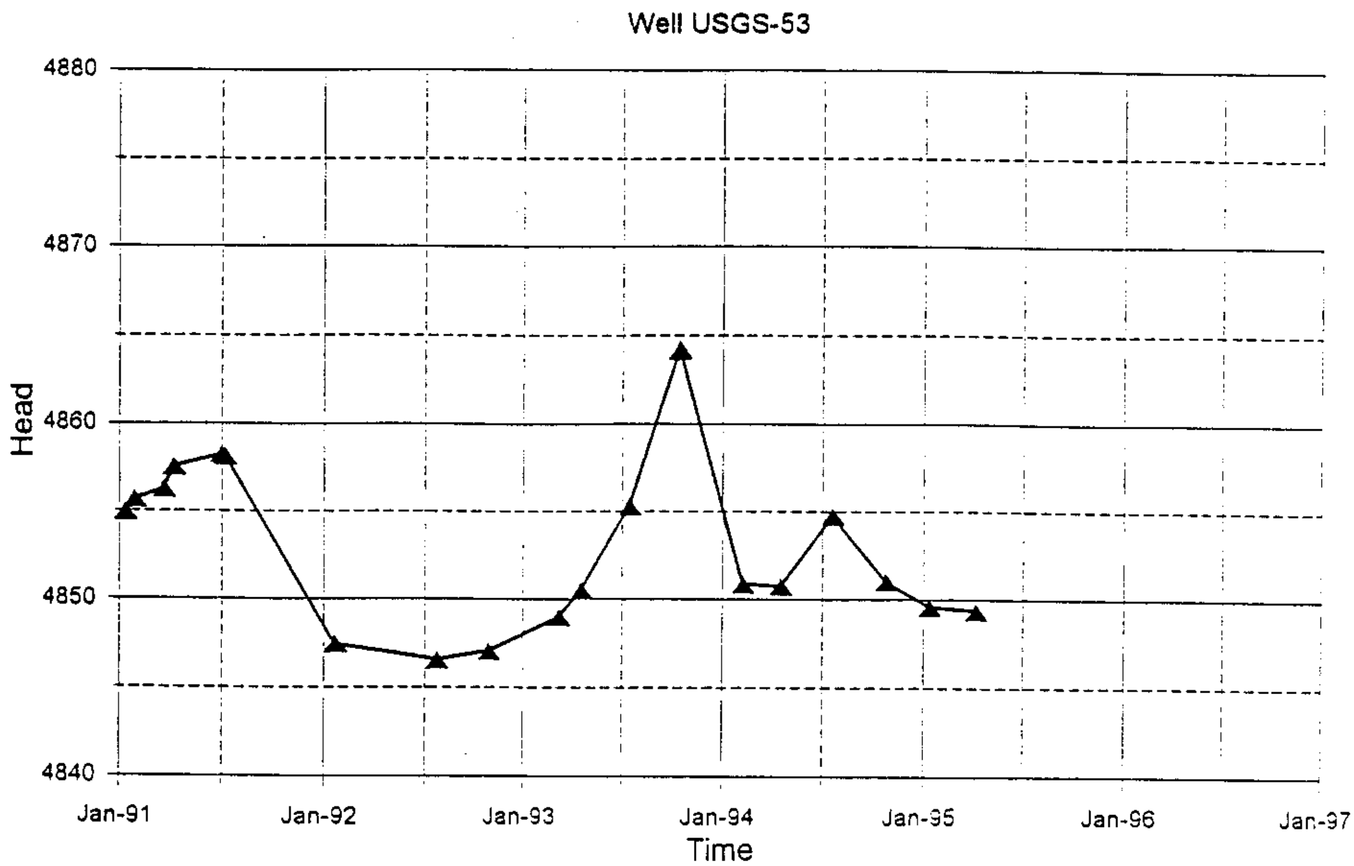
Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/26/93	1509	465.34	4,454.85
1/11/94	1100	465.57	4,454.62
7/13/94	905	466.03	4,454.16
1/9/95	1023	466.28	4,453.91

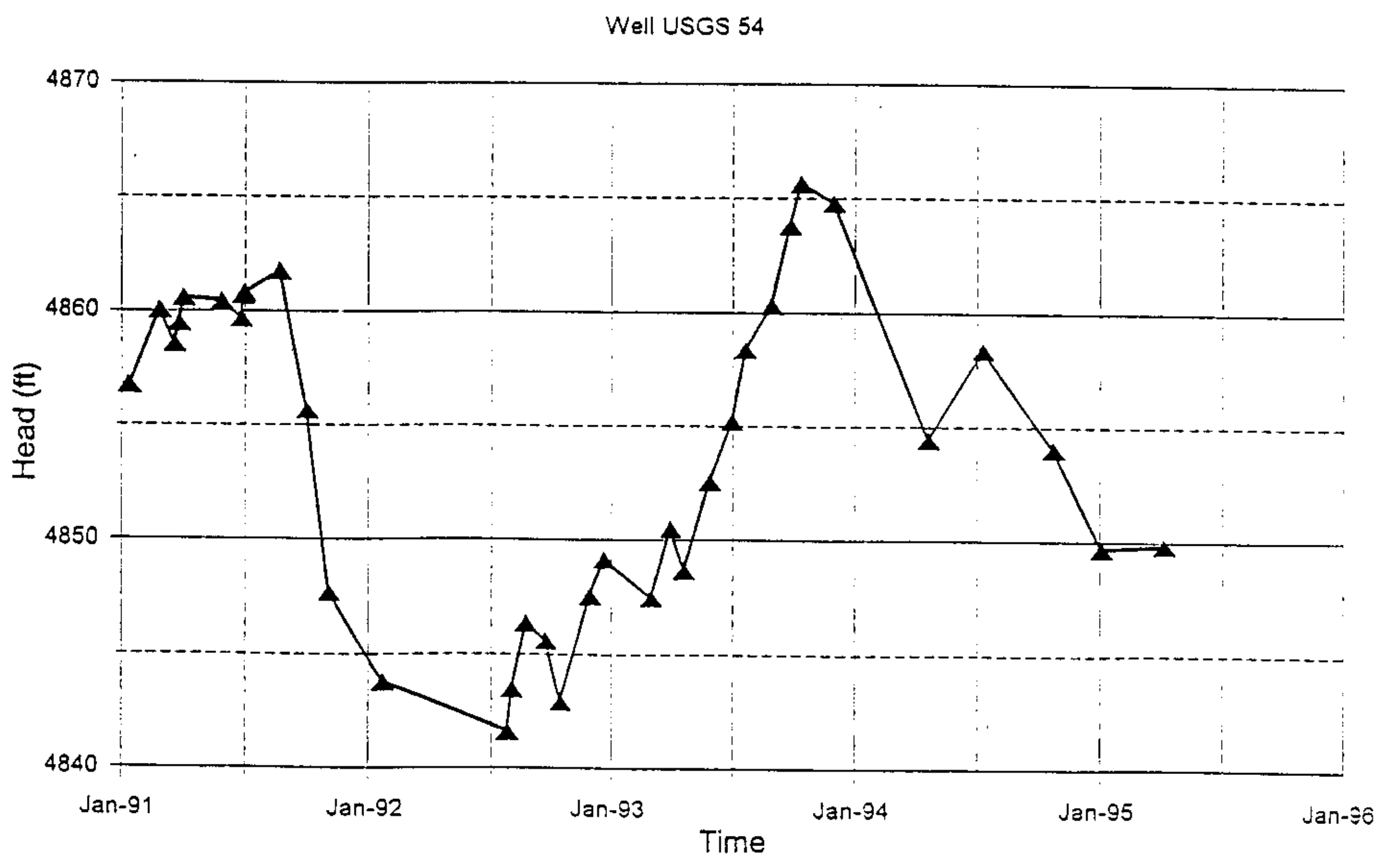
OU 2-12 Depths to Water and Heads

Well Name usgs-065

Meas. Date	Time	Depth to Water ft below meas point	Head ft above mean sea level
7/26/93	1246	469.32	4,456.52
1/10/94	1030	469.20	4,456.64
7/13/94	1030	469.58	4,456.26
1/9/95	1449	468.94	4,456.90

Appendix B - Groundwater Head Plots


Well USGS-53
4880
4870
4860
4850
4840
Head
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Time


Well USGS 54
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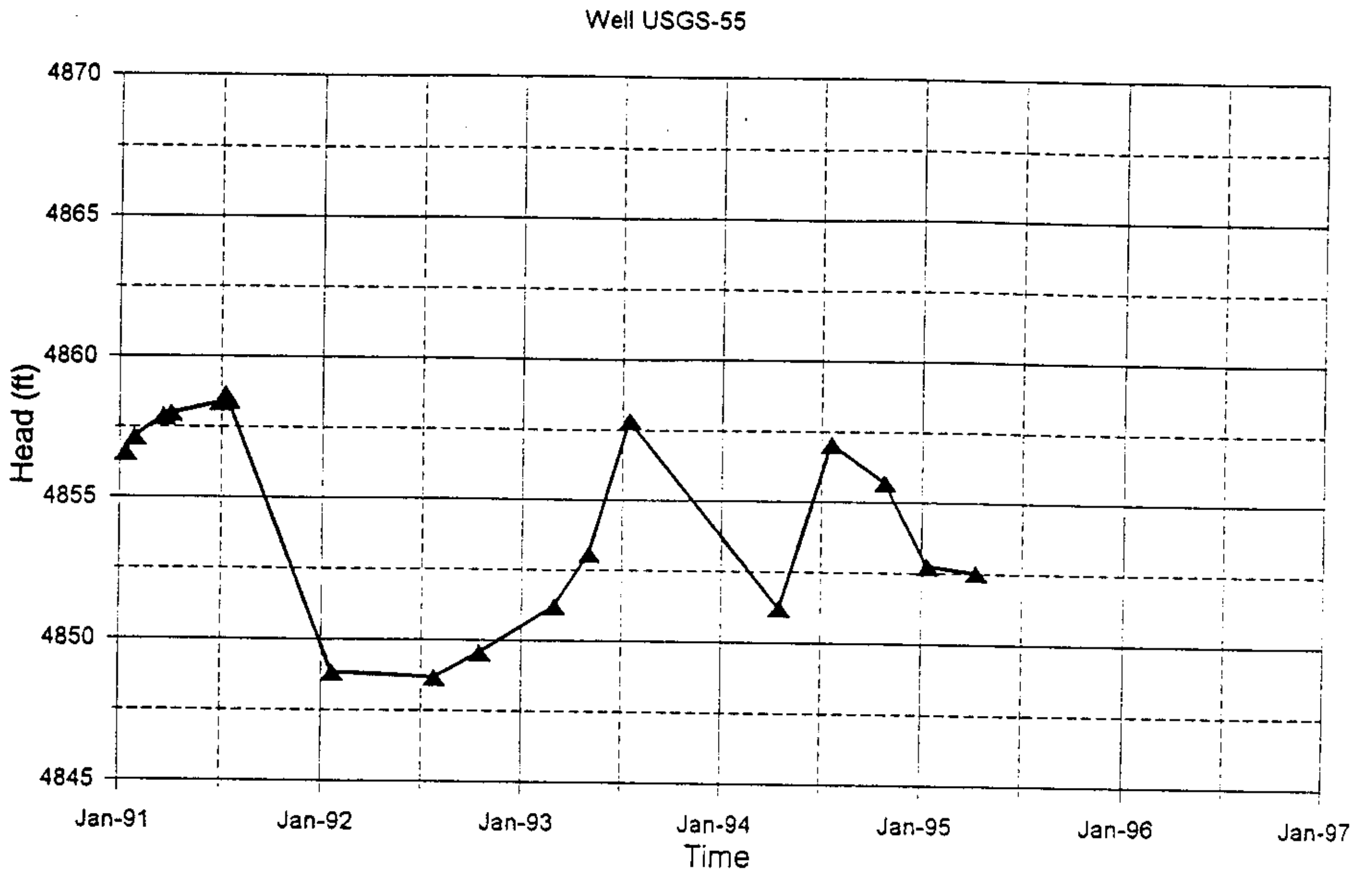
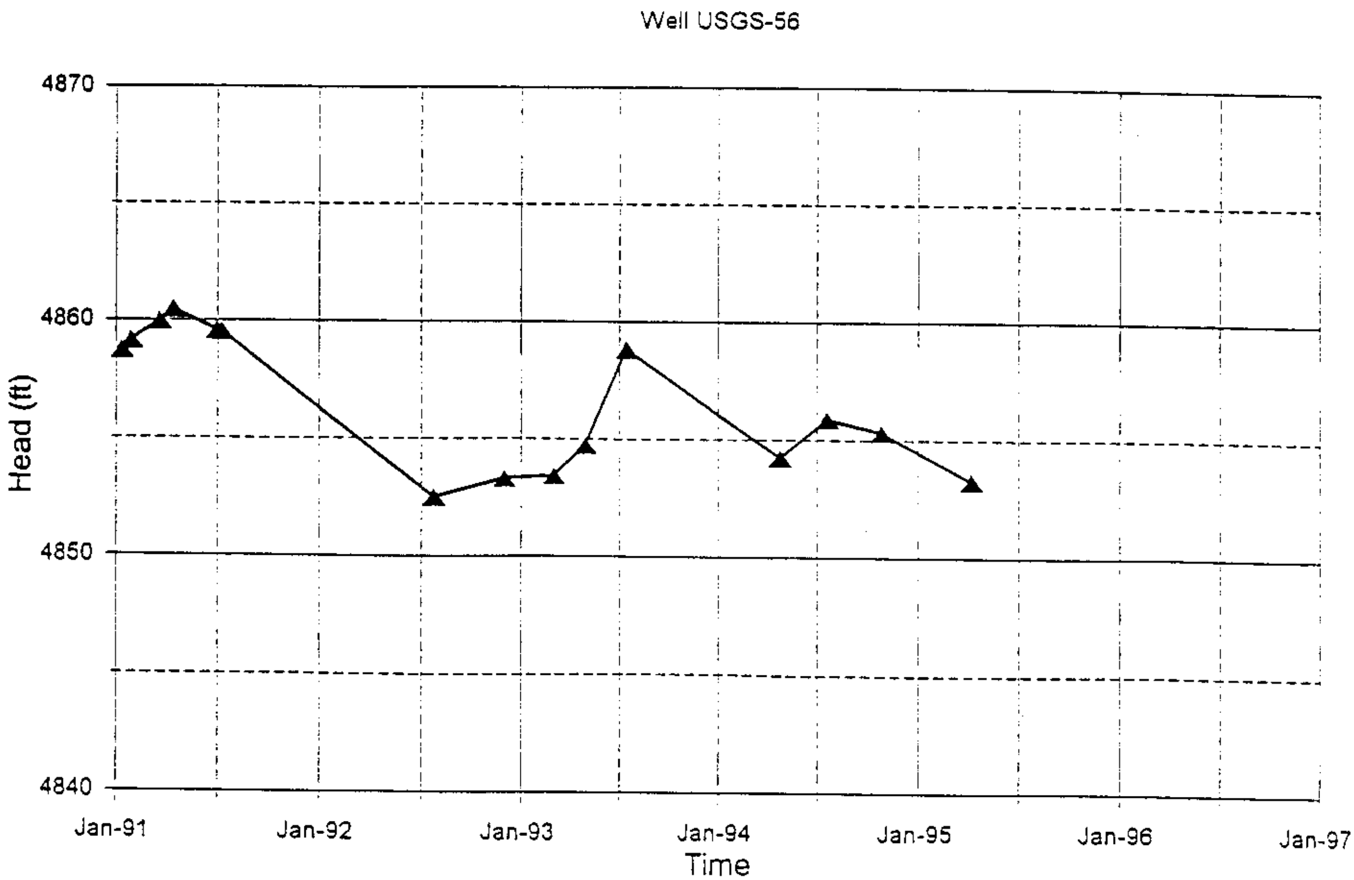
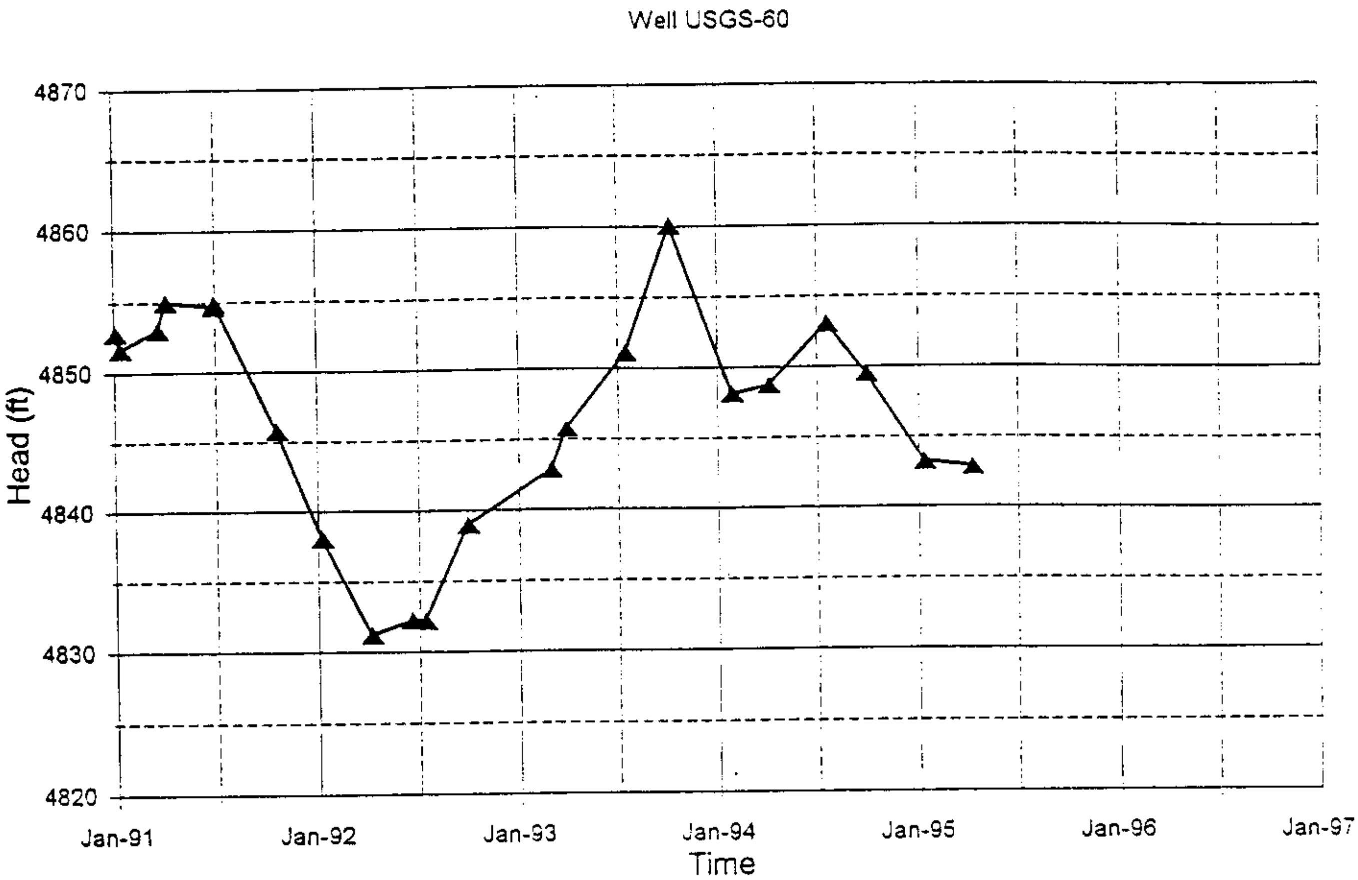
4850
4840
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time



Well USGS-55
4870
4865
4860
4855
4850
4845
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Time



Well USGS-56
4870
4860
4850
4840
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Time


Well USGS-60
4870
4860
4850
4840
4830
4820
Head (ft)
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Jan-92
Jan-93
Jan-94
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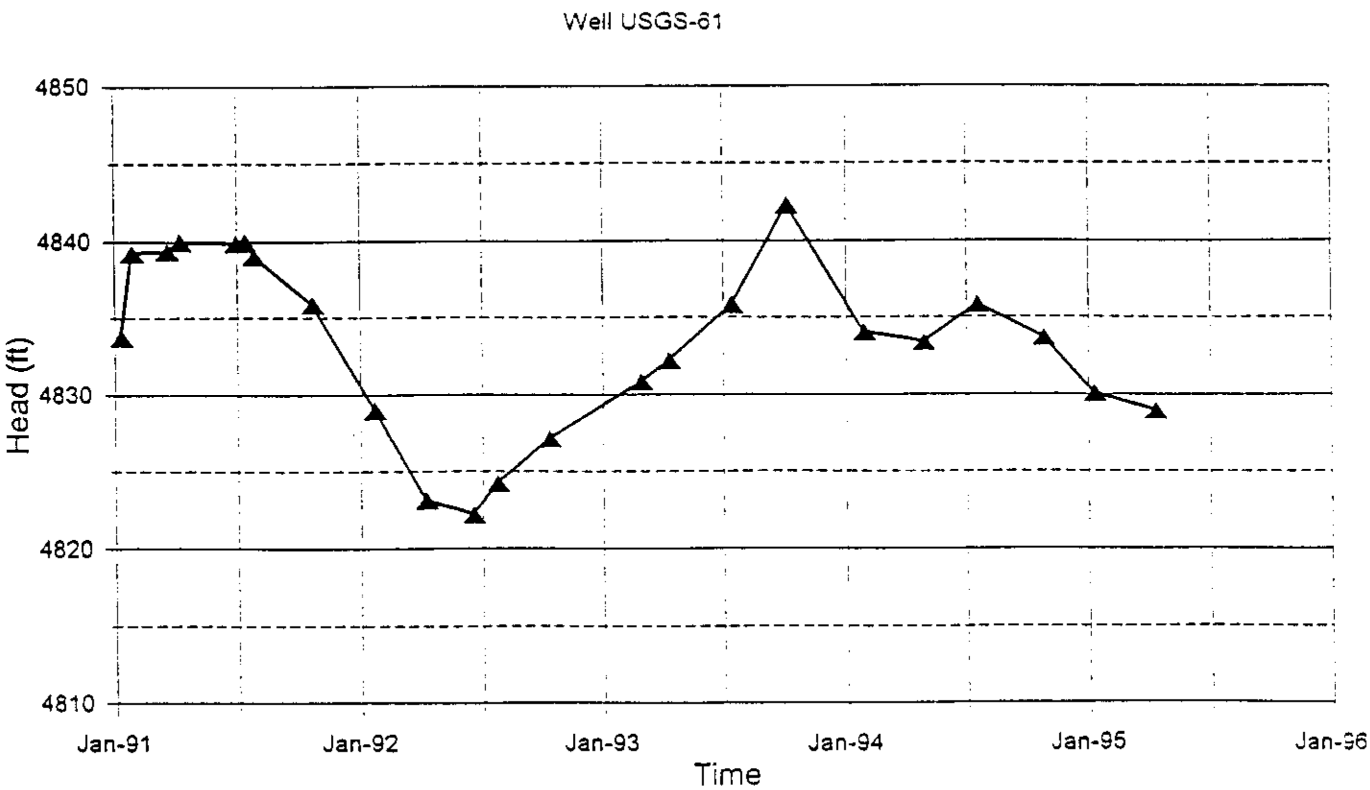
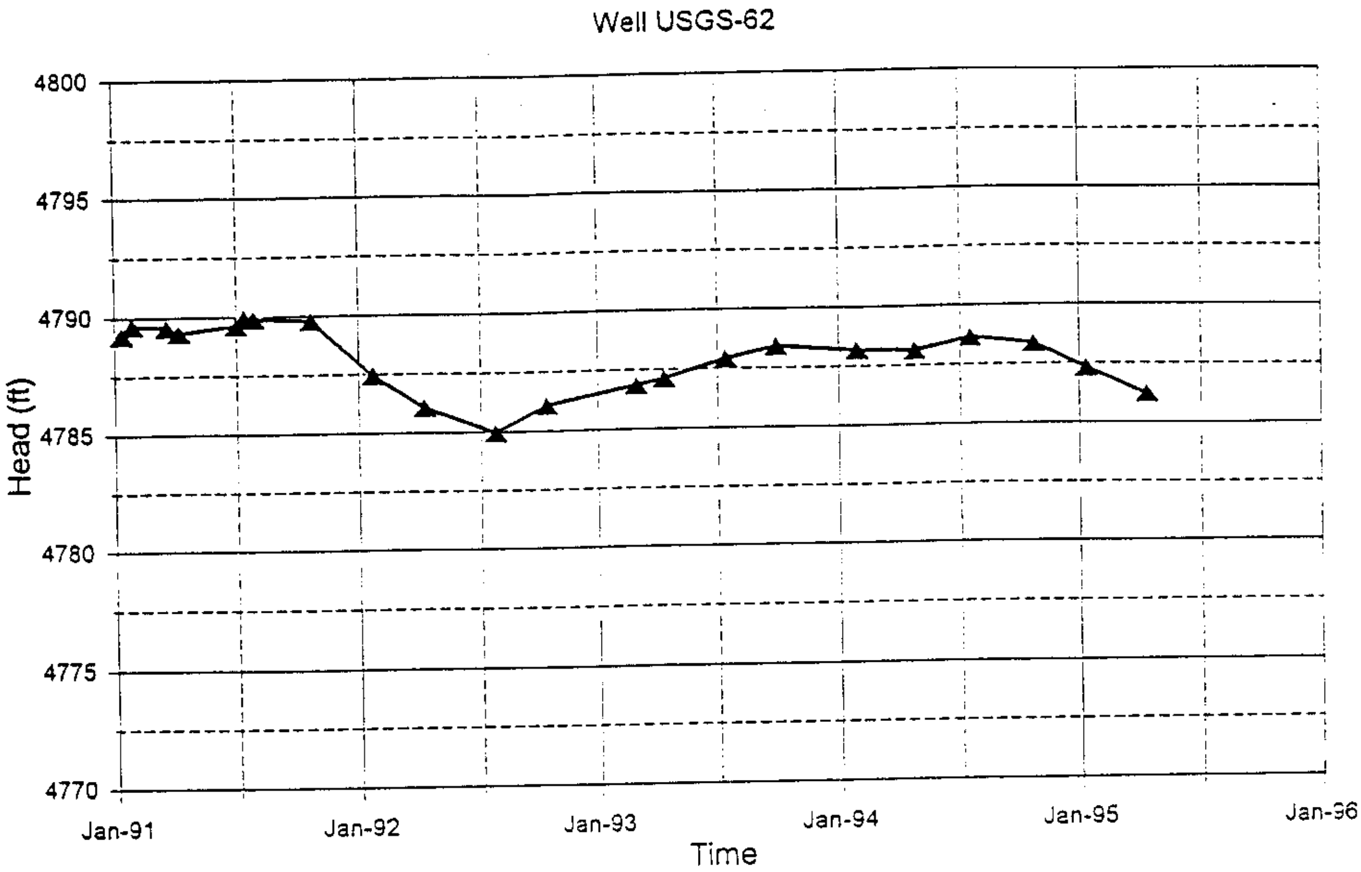
Jan-96
Jan-97
Time


Well USGS-61
4850
4840
4830
4820
4810
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time


Well USGS-62
4800
4795
4790
4785
4780
4775
4770
Head (ft)
Jan-91
Jan-92
Jan-93
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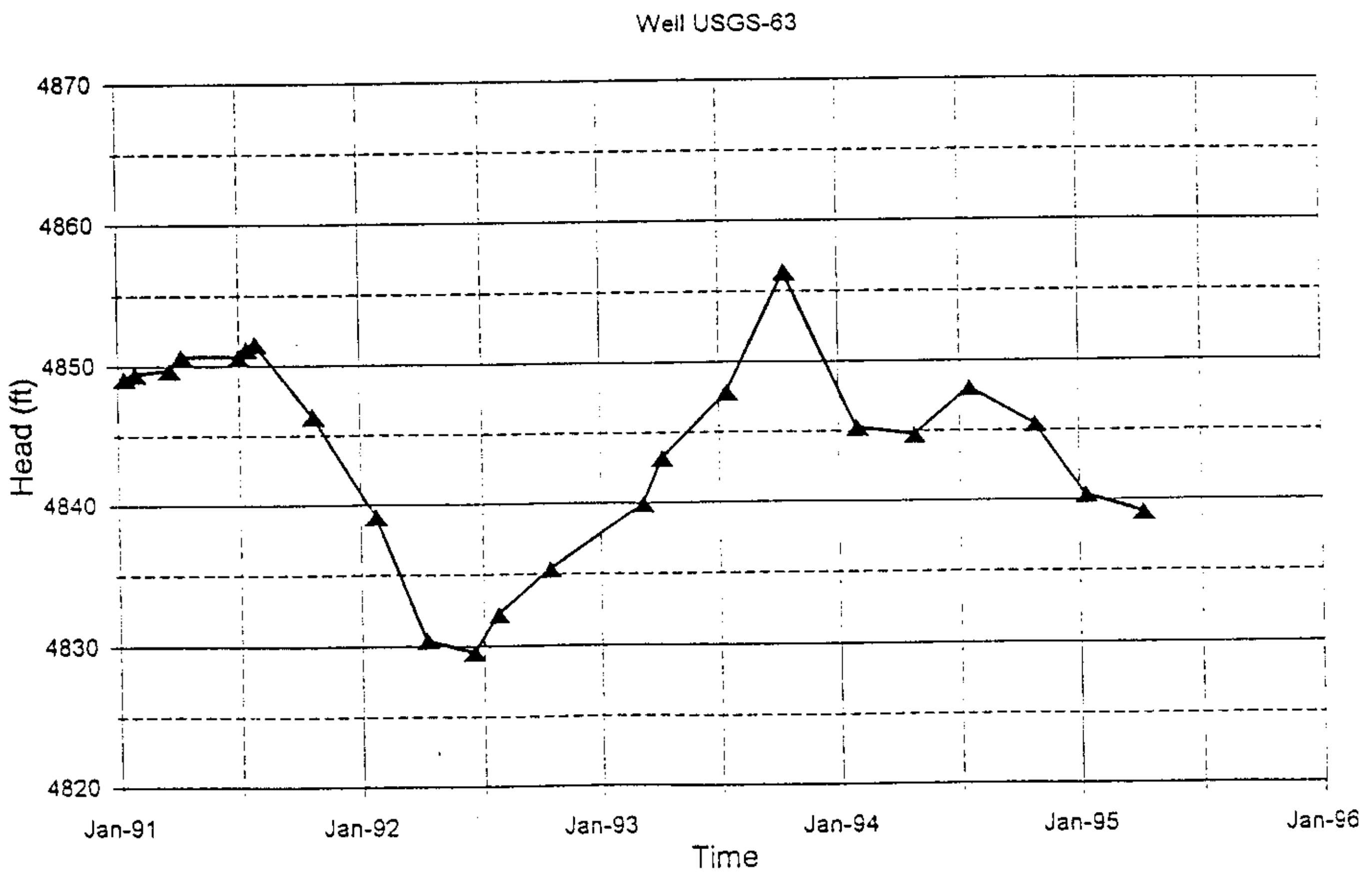
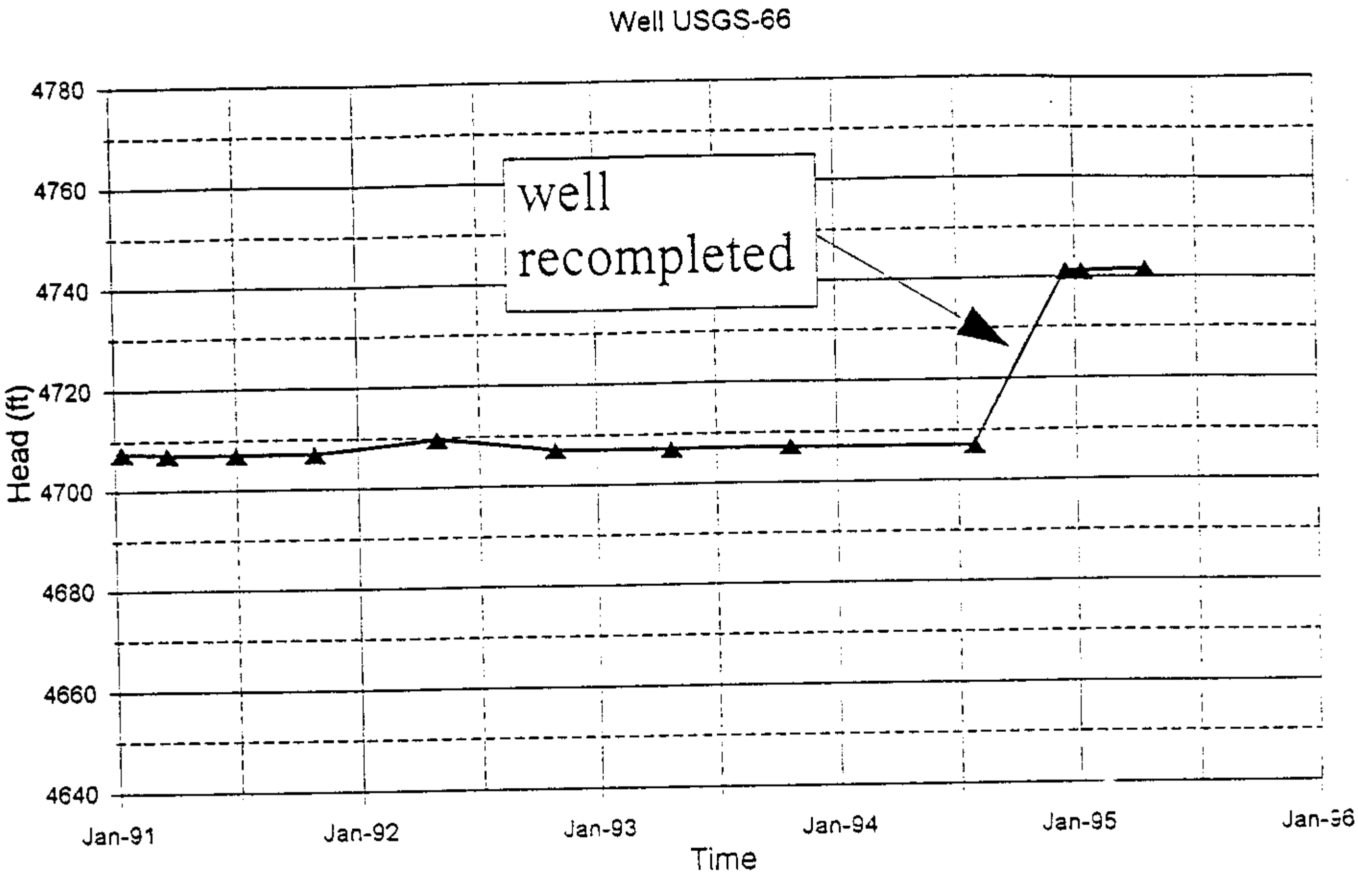
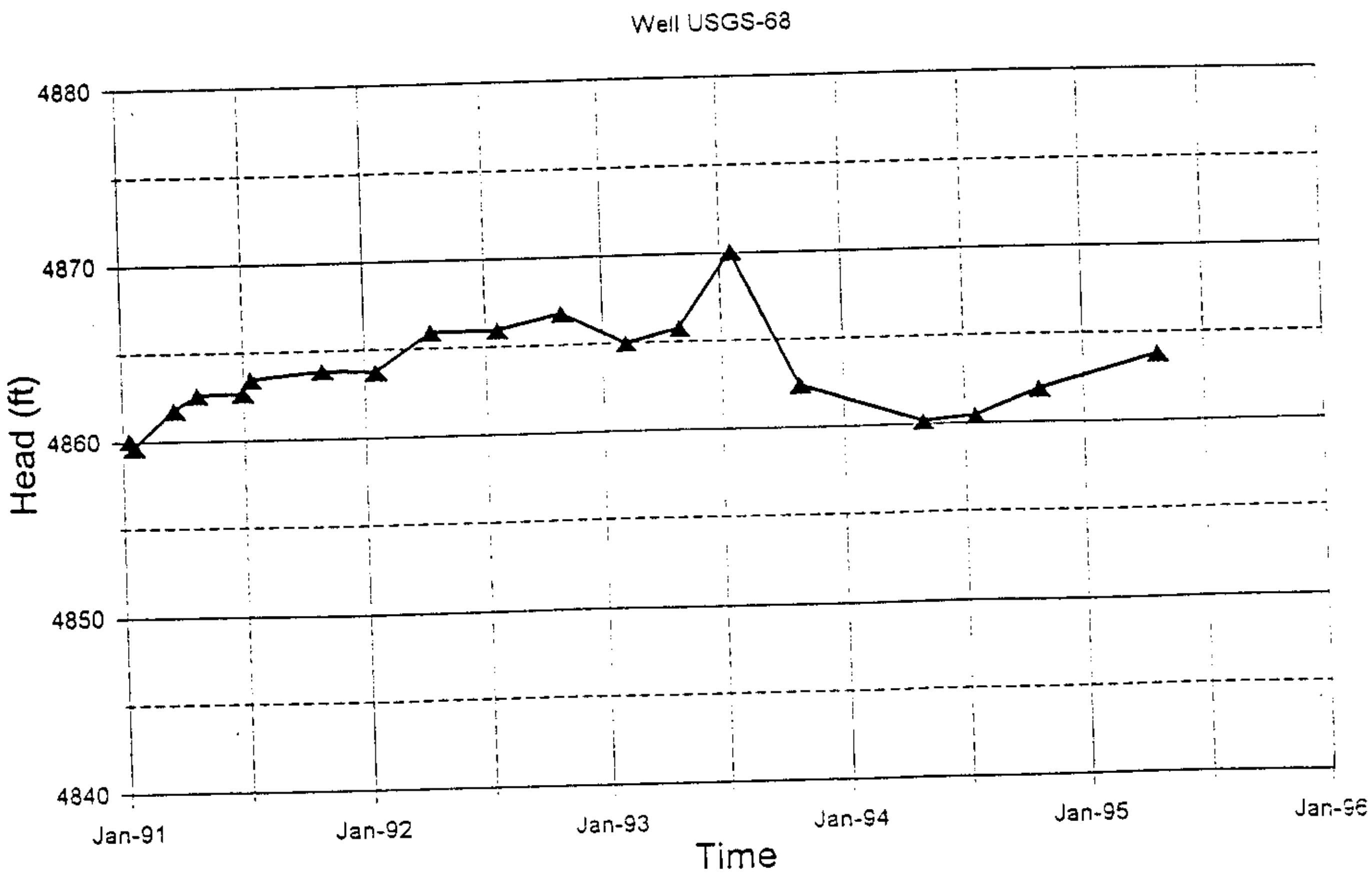
Jan-95
Jan-96
Time


Well USGS-63
4870
4860
4850
4840
4830
4820
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time


Well USGS-66
well recompleted
Head (ft)
4780
4760
4740
4720
4700
4680
4660
4640
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time


Well USGS-68
Head (ft)
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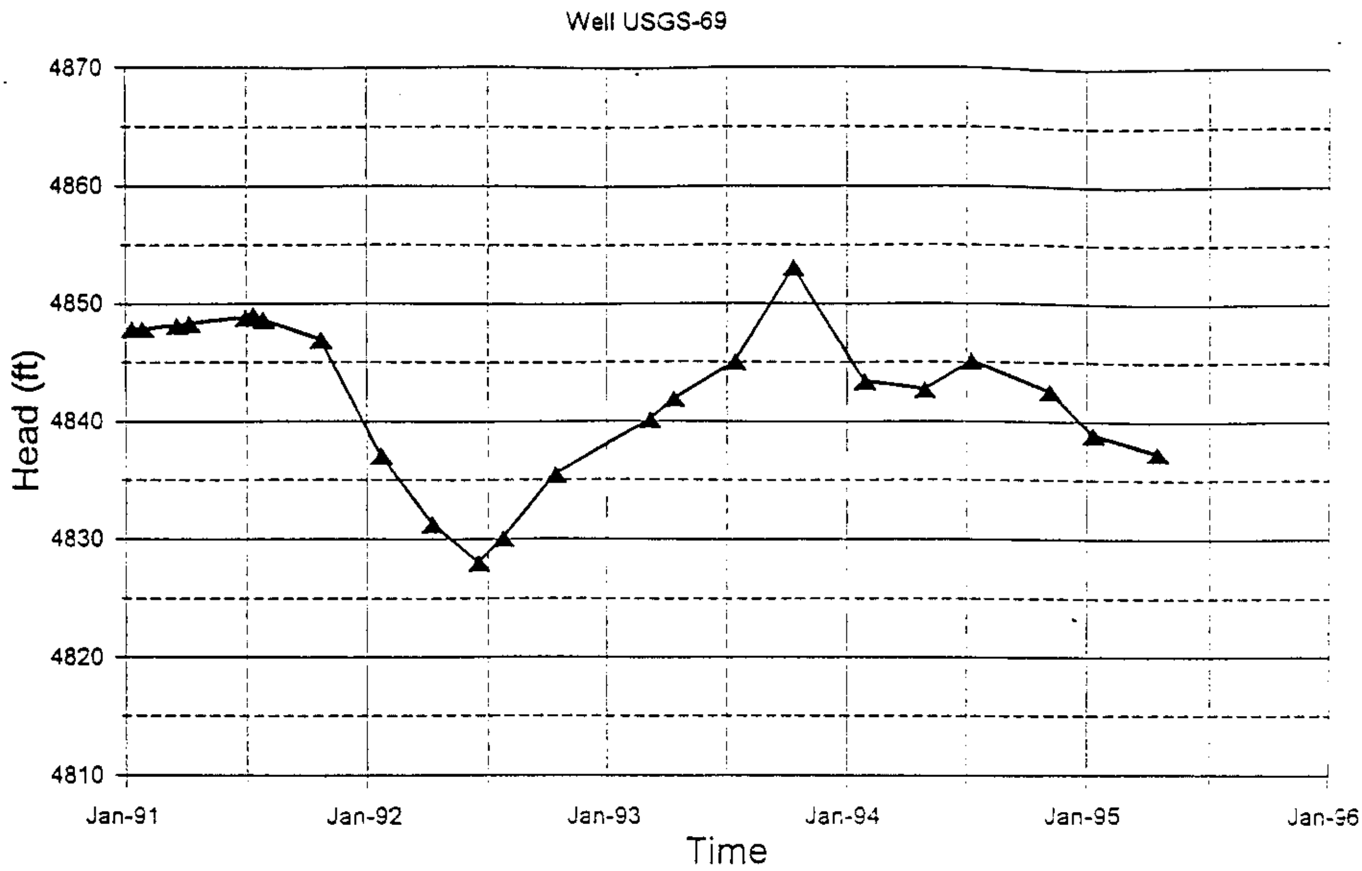
4870
4860
4850
4840
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time


Well USGS-69
Head (ft)
4870
4860
4850
4840
4830
4820
4810
Jan-91
Jan-92
Jan-93
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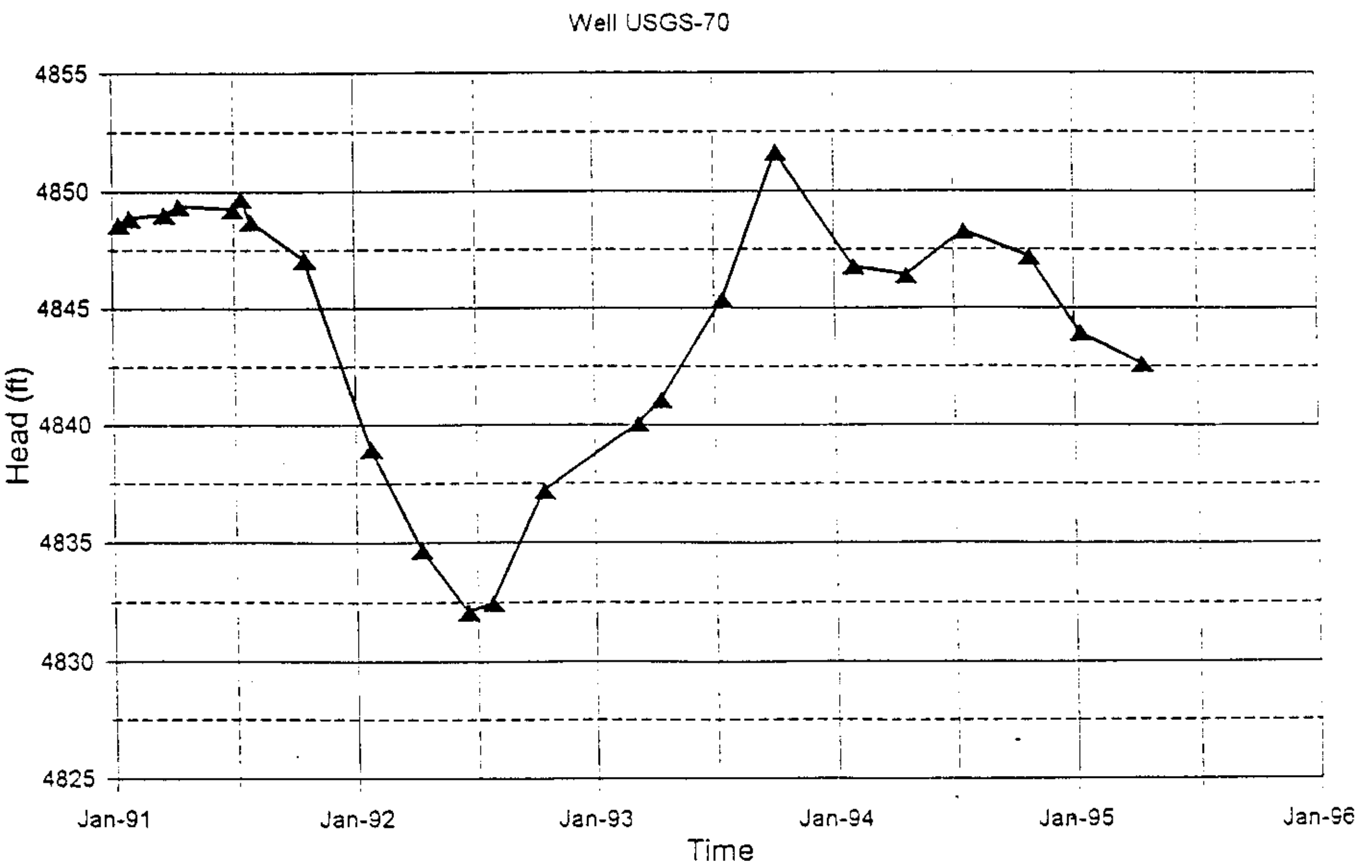
Jan-95
Jan-96
Time


Well USGS-70
Head (ft)
4855
4850
4845
4840
4835
4830
4825
Jan-91
Jan-92
Jan-93
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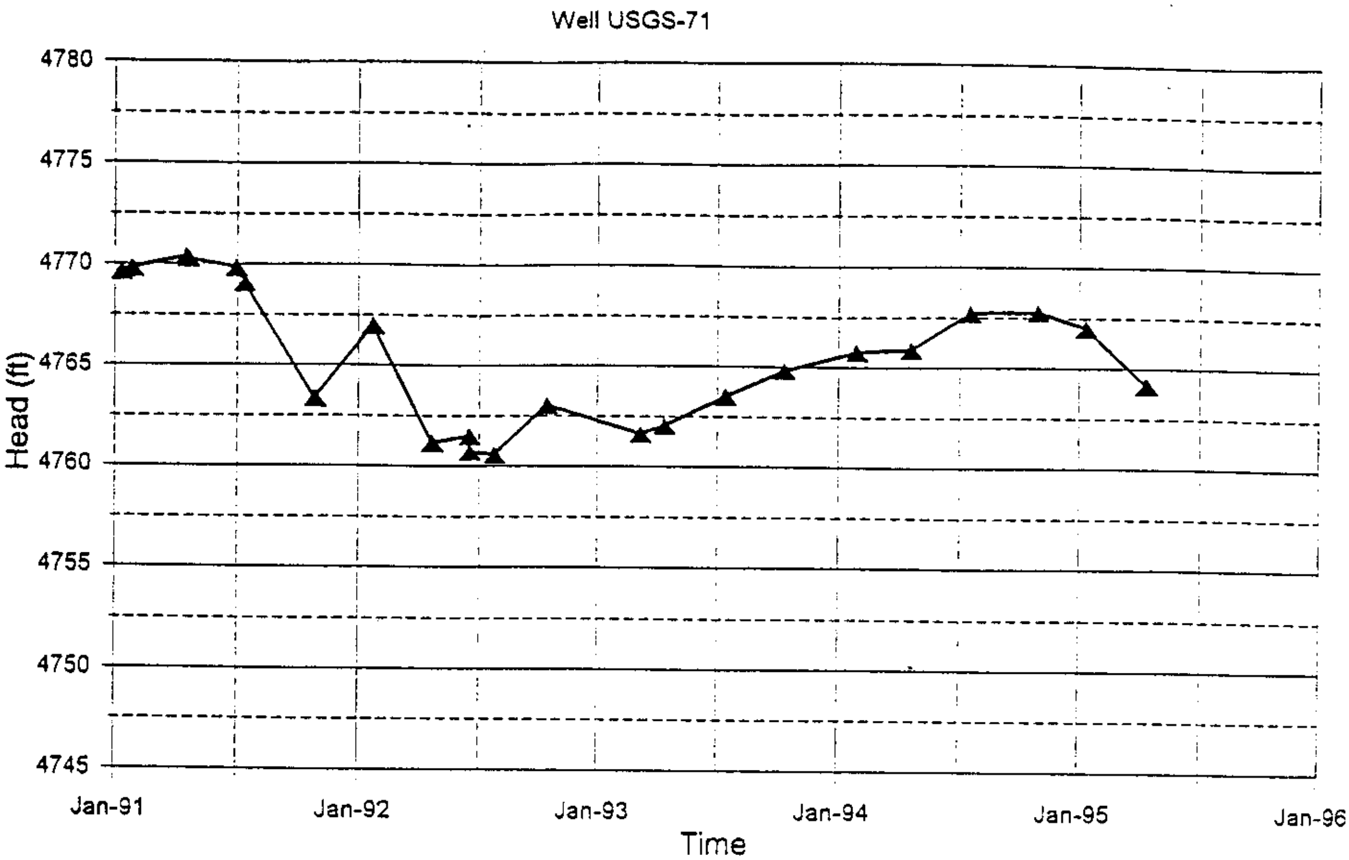
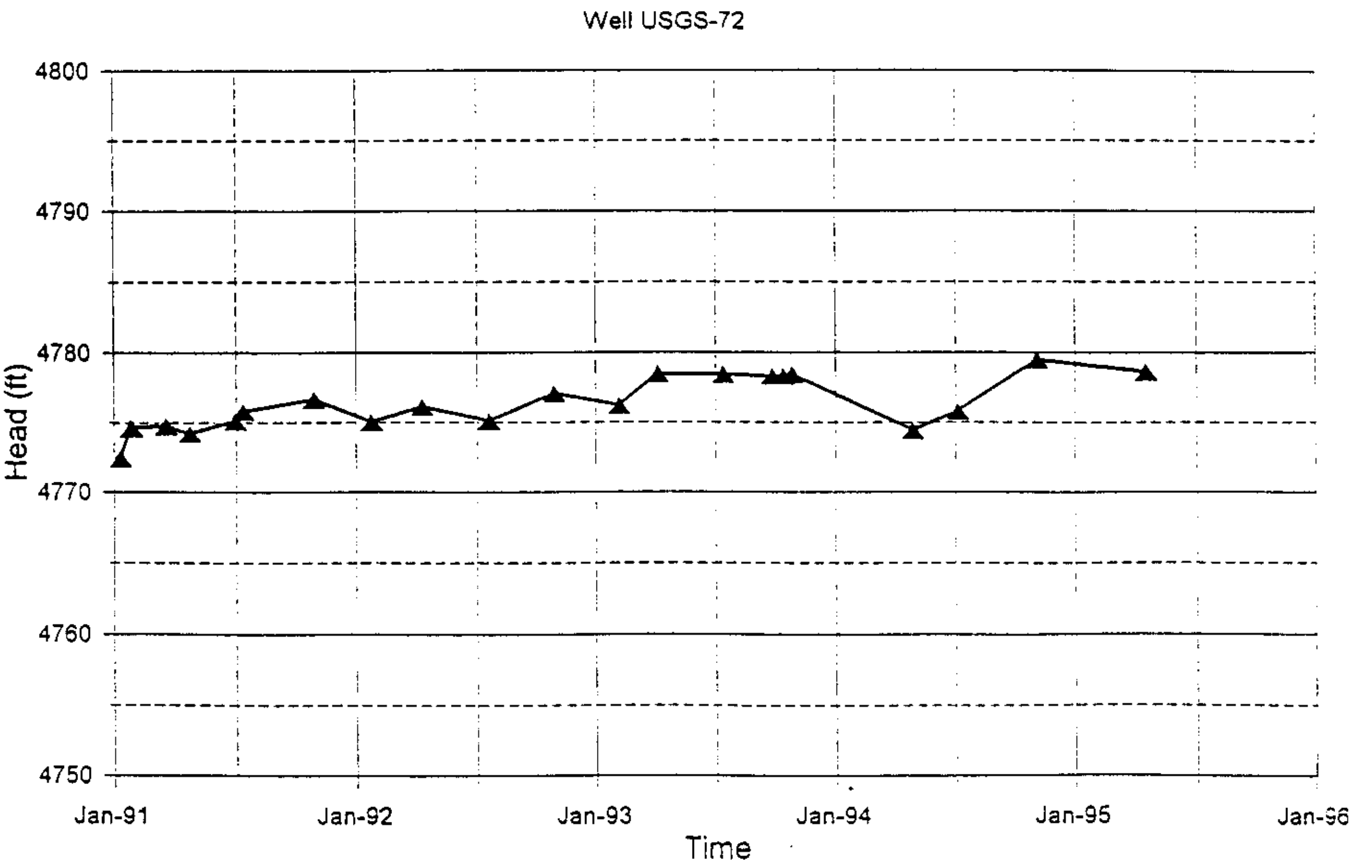
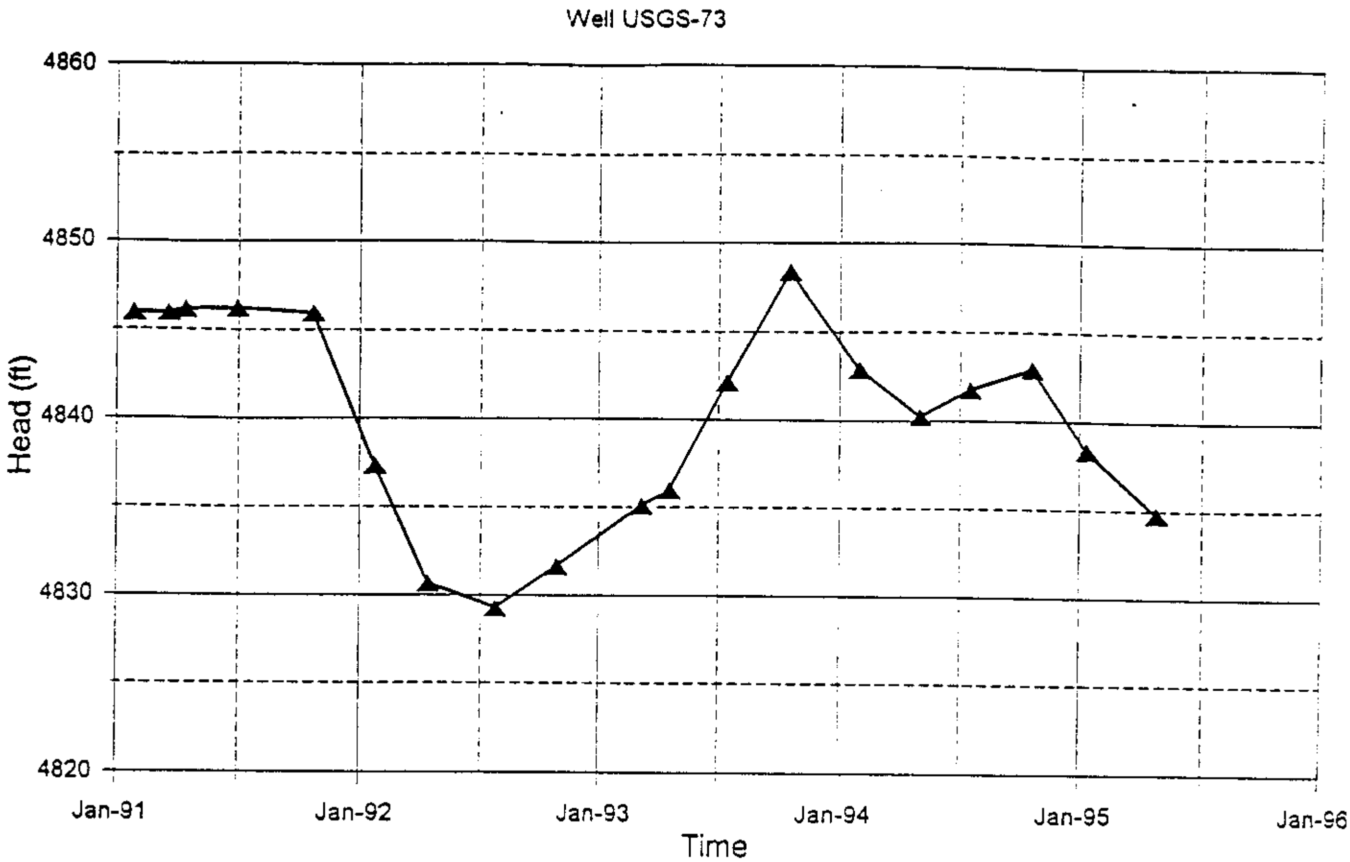
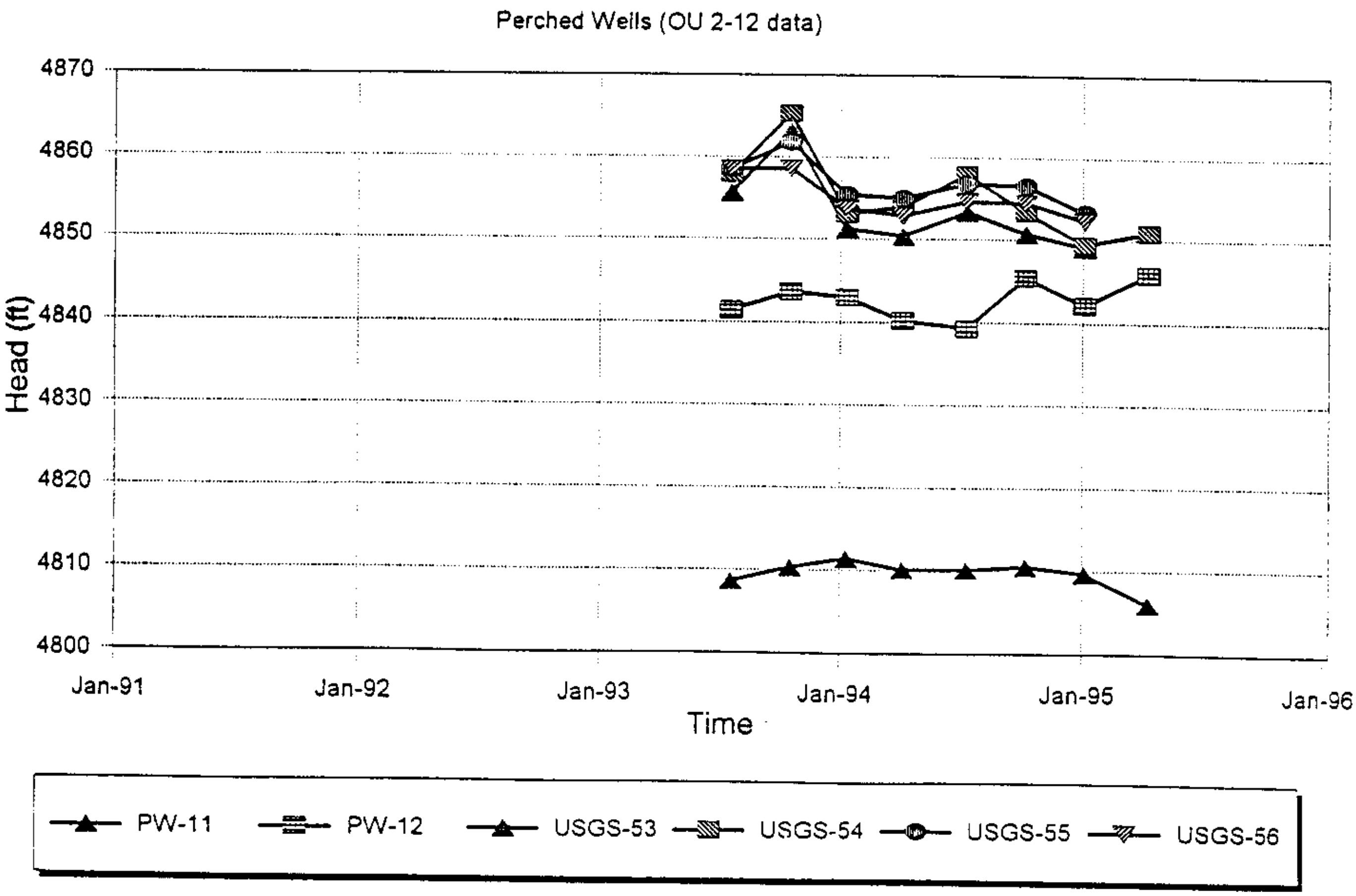
Jan-95
Jan-96
Time


Well USGS-71
4780
4775
4770
4765
4760
4755
4750
4745
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time

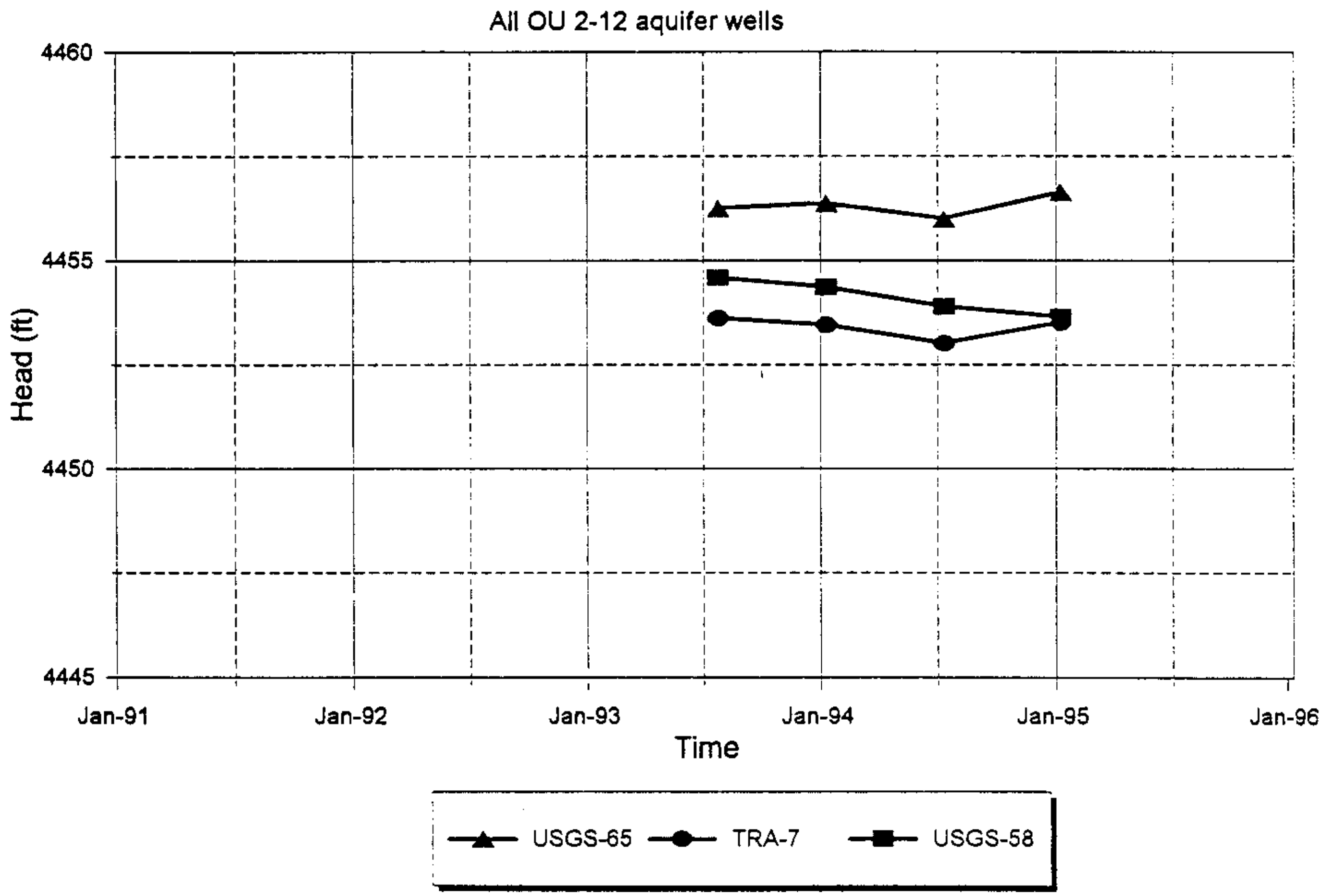

Well USGS-72
4800
4790
4780
4770
4760
4750
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time



Well USGS-73
4860
4850
4840
4830
4820
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time



Perched Wells (OU 2-12 data)
4870
4860
4850
4840
4830
4820
4810
4800
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time
PW-11
PW-12
USGS-53
USGS-54
USGS-55
USGS-56


All OU 2-12 aquifer wells
4460
4455
4450
4445
Head (ft)
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Time
USGS-65
TRA-7
USGS-58

Appendix C - OU 2-12 Post-ROD Data Results

Post-ROD monitoring results are tabulated for each OU 2-12 well. For each well, the contaminant of concern is presented, along with the associated sampling date, monitoring result, and data qualifier flag. The data qualifier flags reflect laboratory and validator applied flags. Refer to Table C-1 for an explanation of the data qualifier flags.

Table C-1. Data qualifier flags applied to OU 2-12 Monitoring Results[a]

Inorganic Analysis Data Flags	
B -	Value is less than the contract required detection limit (CRDL), but greater than the instrument detection limit (IDL).
N -	Spiked sample recovery not within control limits.
S -	Value was determined by the method of standard additions (MSA).
U -	Analyte was analyzed for but not detected.
W -	Post-digestion spike for Furnace AA analysis is out of control limits (85% to 115%), while sample absorbance is less than 50% of spike absorbance.
* -	Duplicate analysis not within control limits.
Inorganic Validation Data Qualifiers	
J -	The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample.
U -	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
UJ -	The material was analyzed for, but was not detected. The associated value is an estimate and may not accurately reflect the instrument detection limit in the sample matrix.
Radiological Data Qualifier Flags	
No flag	The associated sample result is a true positive result and is considered valid and useable.
J -	The associated sample result is an estimated quantity due to quality control or documentation problems. The results should be treated as estimates only. Absolute quantitative or risk assessments should not be made from results flagged with a "J," but these results can be used for yes/no decisions as to whether a contaminant is present at the sampling location.
U -	The constituent of interest was analyzed for, but was not detected above the minimum detectable activity of the instrumentation. There may or may not be a result provided in the data package. If no result is provided a "zero" result should not be entered in its place as the zero may be mistakenly included in statistical calculations performed from the sample results.

a. The flags shown are taken from the applicable Statements of Work (USEPA, 1990a and 1990b), while the validator flags are taken from the programmatic data validation guidance document (EGG, 1993).

Appendix C references

USEPA, 1990a, *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media Multi-Concentration*, ILM03.0, March 1990.

USEPA, 1990b, *USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media Multi-Concentration*, OLM01.9, March 1990.

EGG, 1993, *Environmental Restoration Requirements and Guidance for Data Validation*, EGG-WM-10045, Rev. 1, February 1993.

OU 2-12 Post-ROD Contaminant Data

Well : PW-11

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/6/95	31.00	µg/L	UJ	Yes
Aluminum	4/7/95	53.00	µg/L	BU	Yes
Am-241	7/26/93	0.00	pCi/L	U	No
Am-241	10/20/93	0.00	pCi/L	U	No
Am-241	1/12/94	0.19	pCi/L	U	No
Am-241	4/5/94	0.10	pCi/L	U	No
Am-241	7/12/94	0.04	pCi/L	U	No
Am-241	10/11/94	0.00	pCi/L	U	No
Am-241	1/6/95	0.09	pCi/L	U	No
Am-241	4/7/95	0.01	pCi/L	U	No
Antimony	1/6/95	3.00	µg/L	UJ	Yes
Antimony	4/7/95	3.00	µg/L	U	Yes
Arsenic	7/27/93	2.00	µg/L	BNU	Yes
Arsenic	10/20/93	2.00	µg/L	U	Yes
Arsenic	1/12/94	2.00	µg/L	UW	Yes
Arsenic	4/5/94	3.00	µg/L	U	Yes
Arsenic	7/12/94	6.00	µg/L	UJ	Yes
Arsenic	10/11/94	4.00	µg/L	UJ	Yes
Arsenic	1/6/95	7.00	µg/L	U	Yes
Arsenic	4/7/95	7.00	µg/L	U	Yes
Barium	1/6/95	68.30	µg/L	B	Yes
Barium	4/7/95	63.60	µg/L	B	Yes
Beryllium	7/27/93	5.00	µg/L	U	Yes
Beryllium	10/20/93	4.00	µg/L	U	Yes
Beryllium	1/12/94	4.00	µg/L	U	Yes
Beryllium	4/5/94	2.40	µg/L	BU	Yes
Beryllium	7/12/94	0.70	µg/L	U	Yes
Beryllium	10/11/94	0.20	µg/L	UJ	Yes
Beryllium	1/6/95	4.00	µg/L	U	Yes
Beryllium	4/7/95	4.00	µg/L	U	Yes
Cadmium	7/27/93	5.00	µg/L	U	Yes
Cadmium	10/20/93	7.80	µg/L	*UJ	Yes
Cadmium	1/12/94	2.00	µg/L	U	Yes
Cadmium	4/5/94	2.00	µg/L	U	Yes
Cadmium	7/12/94	0.80	µg/L	U	Yes
Cadmium	10/11/94	0.40	µg/L	U	Yes
Cadmium	1/6/95	11.90	µg/L	*UJ	Yes
Cadmium	4/7/95	4.00	µg/L	U	Yes
Calcium	1/6/95	78,600.00	µg/L		Yes
Calcium	4/7/95	86,800.00	µg/L		Yes
Chromium	7/27/93	113.00	µg/L		Yes
Chromium	10/20/93	92.90	µg/L		Yes
Chromium	1/12/94	98.00	µg/L		Yes
Chromium	4/5/94	88.70	µg/L		Yes
Chromium	7/12/94	98.20	µg/L		Yes
Chromium	10/11/94	98.00	µg/L		Yes
Chromium	1/6/95	95.00	µg/L		Yes
Chromium	4/7/95	94.10	µg/L		Yes
Co-60	10/20/93	0.02	pCi/mL		No
Co-60	1/12/94	0.02	pCi/mL		No
Co-60	4/5/94	0.02	pCi/mL		No
Co-60	7/12/94	0.03	pCi/mL		No
Co-60	10/11/94	0.02	pCi/mL		No
Co-60	1/6/95	0.02	pCi/mL		No
Co-60	4/7/95	0.02	pCi/mL		No
Cobalt	7/27/93	17.00	µg/L	U	Yes
Cobalt	10/20/93	7.00	µg/L	UN	Yes

OU 2-12 Post-ROD Contaminant Data

Well : PW-11

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Cobalt	1/12/94	12.00	µg/L	U	Yes
Cobalt	4/5/94	11.00	µg/L	U	Yes
Cobalt	7/12/94	3.00	µg/L	U	Yes
Cobalt	10/11/94	1.00	µg/L	UJ	Yes
Cobalt	1/6/95	19.00	µg/L	U	Yes
Cobalt	4/7/95	12.00	µg/L	U	Yes
Copper	1/6/95	12.00	µg/L	U	Yes
Copper	4/7/95	12.00	µg/L	U	Yes
Fluoride	7/27/93	240.00	µg/L	J	No
Fluoride	10/20/93	210.00	µg/L		No
Fluoride	1/12/94	240.00	µg/L		No
Fluoride	4/5/94	220.00	µg/L		No
Fluoride	7/12/94	240.00	µg/L		No
Fluoride	10/11/94	240.00	µg/L		No
Fluoride	1/6/95	220.00	µg/L		No
Fluoride	4/7/95	180.00	µg/L		No
Gamma	7/27/93		pCi/mL	U	No
Hexavalent Chromium	7/27/93	111.00	µg/L	J	Yes
Hexavalent Chromium	10/20/93	90.00	µg/L		Yes
Hexavalent Chromium	1/12/94	80.00	µg/L		Yes
Hexavalent Chromium	4/5/94	98.60	µg/L		Yes
Hexavalent Chromium	7/12/94	91.80	µg/L		Yes
Hexavalent Chromium	10/11/94	89.40	µg/L		Yes
Hexavalent Chromium	1/6/95	96.60	µg/L		Yes
Hexavalent Chromium	4/7/95	96.00	µg/L		Yes
Iron	1/6/95	23.00	µg/L	U	Yes
Iron	4/7/95	167.00	µg/L	*	Yes
Lead	7/27/93	1.00	µg/L	U	Yes
Lead	10/20/93	1.00	µg/L	UNW	Yes
Lead	1/12/94	1.00	µg/L	UW	Yes
Lead	4/5/94	1.00	µg/L	U	Yes
Lead	7/12/94	3.00	µg/L	NUJ	Yes
Lead	10/11/94	1.70	µg/L	UJ	Yes
Lead	1/6/95	2.80	µg/L	U	Yes
Lead	4/7/95	2.80	µg/L	U	Yes
Magnesium	1/6/95	16,400.00	µg/L		Yes
Magnesium	4/7/95	16,500.00	µg/L		Yes
Manganese	7/27/93	4.00	µg/L	U	Yes
Manganese	10/20/93	5.00	µg/L	B	Yes
Manganese	1/12/94	3.00	µg/L	U	Yes
Manganese	4/5/94	3.00	µg/L	U	Yes
Manganese	7/12/94	1.00	µg/L	U	Yes
Manganese	10/11/94	4.00	µg/L	UJ	Yes
Manganese	1/6/95	6.00	µg/L	U	Yes
Manganese	4/7/95	7.00	µg/L	U	Yes
Mercury	1/6/95	0.10	µg/L	U	Yes
Mercury	4/7/95	0.10	µg/L	U	Yes
Nickel	1/6/95	17.00	µg/L	U	Yes
Nickel	4/7/95	14.00	µg/L	U	Yes
Potassium	1/6/95	3,320.00	µg/L	B	Yes
Potassium	4/7/95	3,950.00	µg/L	BJ	Yes
Selenium	1/6/95	4.90	µg/L	UN	Yes
Selenium	4/7/95	4.90	µg/L	U	Yes
Silver	1/6/95	2.00	µg/L	U	Yes
Silver	4/7/95	2.00	µg/L	U	Yes
Sodium	1/6/95	18,300.00	µg/L		Yes
Sodium	4/7/95	13,900.00	µg/L		Yes
Sr-90	7/26/93	0.01	pCi/mL		No

OU 2-12 Post-ROD Contaminant Data

Well : PW-11

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Sr-90	10/20/93	0.00	pCi/mL		No
Sr-90	1/12/94	0.00	pCi/mL	UJ	No
Sr-90	4/5/94	0.00	pCi/mL		No
Sr-90	7/12/94	0.00	pCi/mL		No
Sr-90	10/11/94	0.00	pCi/mL	U	No
Sr-90	1/6/95	0.00	pCi/mL	U	No
Sr-90	4/7/95	0.00	pCi/mL		No
Thallium	1/6/95	7.00	µg/L	U	Yes
Thallium	4/7/95	7.00	µg/L	U	Yes
Tritium	7/26/93	112.00	pCi/mL		No
Tritium	10/20/93	130.00	pCi/mL		No
Tritium	1/12/94	126.00	pCi/mL		No
Tritium	4/5/94	130.00	pCi/mL		No
Tritium	7/12/94	123.00	pCi/mL		No
Tritium	10/11/94	115.00	pCi/mL		No
Tritium	1/6/95	135.00	pCi/mL		No
Tritium	4/7/95	130.00	pCi/mL		No
Vanadium	1/6/95	21.00	µg/L	U	Yes
Vanadium	4/7/95	15.00	µg/L	U	Yes
Zinc	1/6/95	12.00	µg/L	U	Yes
Zinc	4/7/95	5.00	µg/L	U	Yes

Well : PW-12

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/6/95	31.00	µg/L	UJ	Yes
Aluminum	4/10/95	47.60	µg/L	BU	Yes
Am-241	7/28/93	1.30	pCi/L		No
Am-241	10/19/93	1.80	pCi/L		No
Am-241	1/6/94	1.30	pCi/L		No
Am-241	4/5/94	0.46	pCi/L		No
Am-241	7/12/94	0.00	pCi/L	U	No
Am-241	7/12/94	0.00	pCi/L	U	No
Am-241	10/11/94	0.10	pCi/L	U	No
Am-241	10/11/94	0.18	pCi/L	U	No
Am-241	1/6/95	0.49	pCi/L		No
Am-241	4/10/95	0.15	pCi/L	UJ	No
Antimony	1/6/95	41.80	µg/L	BJ	Yes
Antimony	4/10/95	3.00	µg/L	U	Yes
Arsenic	7/28/93	2.00	µg/L	UWN	Yes
Arsenic	10/19/93	2.00	µg/L	U	Yes
Arsenic	1/6/94	2.00	µg/L	UW	Yes
Arsenic	4/5/94	3.00	µg/L	UW	Yes
Arsenic	7/12/94	6.00	µg/L	UJ	No
Arsenic	7/12/94	6.00	µg/L	UJ	Yes
Arsenic	7/12/94	6.00	µg/L	UJ	Yes
Arsenic	10/11/94	4.00	µg/L	UJ	Yes
Arsenic	10/11/94	4.00	µg/L	UJ	Yes
Arsenic	1/6/95	7.00	µg/L	U	Yes
Arsenic	4/10/95	7.00	µg/L	U	Yes
Barium	1/6/95	197.00	µg/L	B	Yes
Barium	4/10/95	187.00	µg/L	B	Yes
Beryllium	7/28/93	5.00	µg/L	U	Yes
Beryllium	10/19/93	4.00	µg/L	U	Yes
Beryllium	1/6/94	4.00	µg/L	U	Yes
Beryllium	4/5/94	1.00	µg/L	U	Yes

OU 2-12 Post-ROD Contaminant Data

Well : PW-12

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Beryllium	7/12/94	0.70	µg/L	U	No
Beryllium	7/12/94	0.70	µg/L	U	Yes
Beryllium	7/12/94	0.70	µg/L	U	Yes
Beryllium	10/11/94	0.20	µg/L	UJ	Yes
Beryllium	10/11/94	0.20	µg/L	UJ	Yes
Beryllium	1/6/95	4.00	µg/L	U	Yes
Beryllium	4/10/95	4.00	µg/L	U	Yes
Cadmium	7/28/93	5.00	µg/L	U	Yes
Cadmium	10/19/93	5.00	µg/L	*UJ	Yes
Cadmium	1/6/94	2.00	µg/L	U	Yes
Cadmium	4/5/94	2.00	µg/L	U	Yes
Cadmium	7/12/94	0.80	µg/L	U	No
Cadmium	7/12/94	0.80	µg/L	U	Yes
Cadmium	7/12/94	0.80	µg/L	U	Yes
Cadmium	10/11/94	0.40	µg/L	U	Yes
Cadmium	10/11/94	0.40	µg/L	U	Yes
Cadmium	1/6/95	9.60	µg/L	*UJ	Yes
Cadmium	4/10/95	4.00	µg/L	U	Yes
Calcium	1/6/95	62,000.00	µg/L		Yes
Calcium	4/10/95	65,000.00	µg/L		Yes
Chromium	7/28/93	6.00	µg/L	U	Yes
Chromium	10/19/93	6.00	µg/L	U	Yes
Chromium	1/6/94	5.00	µg/L	U	Yes
Chromium	4/5/94	7.00	µg/L	U	Yes
Chromium	7/12/94	1.00	µg/L	UJ	No
Chromium	7/12/94	1.00	µg/L	UJ	Yes
Chromium	7/12/94	1.00	µg/L	UJ	Yes
Chromium	10/11/94	9.00	µg/L	U	Yes
Chromium	10/11/94	9.00	µg/L	U	Yes
Chromium	1/6/95	9.00	µg/L	U	Yes
Chromium	4/10/95	8.00	µg/L	U	Yes
Co-60	7/28/93	0.23	pCi/mL		No
Co-60	10/19/93	0.31	pCi/mL		No
Co-60	1/6/94	0.17	pCi/mL		No
Co-60	4/5/94	0.18	pCi/mL		No
Co-60	7/12/94	0.13	pCi/mL		No
Co-60	7/12/94	0.14	pCi/mL		No
Co-60	10/11/94	0.14	pCi/mL		No
Co-60	10/11/94	0.15	pCi/mL		No
Co-60	1/6/95	0.33	pCi/mL		No
Co-60	4/10/95	0.16	pCi/mL		No
Cobalt	7/28/93	17.00	µg/L	U	Yes
Cobalt	10/19/93	7.00	µg/L	UN	Yes
Cobalt	1/6/94	12.00	µg/L	U	Yes
Cobalt	4/5/94	11.00	µg/L	U	Yes
Cobalt	7/12/94	3.00	µg/L	U	No
Cobalt	7/12/94	3.00	µg/L	U	Yes
Cobalt	7/12/94	3.00	µg/L	U	Yes
Cobalt	10/11/94	1.00	µg/L	UJ	Yes
Cobalt	10/11/94	1.00	µg/L	UJ	Yes
Cobalt	1/6/95	19.00	µg/L	U	Yes
Cobalt	4/10/95	12.00	µg/L	U	Yes
Copper	1/6/95	12.00	µg/L	U	Yes
Copper	4/10/95	12.00	µg/L	U	Yes
Fluoride	7/28/93	170.00	µg/L	J	No
Fluoride	10/19/93	200.00	µg/L		No
Fluoride	1/6/94	170.00	µg/L		No
Fluoride	4/5/94	170.00	µg/L		No

OU 2-12 Post-ROD Contaminant Data

Well : PW-12

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Fluoride	7/12/94	170.00	µg/L		No
Fluoride	7/12/94	180.00	µg/L		No
Fluoride	10/11/94	180.00	µg/L		No
Fluoride	10/11/94	190.00	µg/L		No
Fluoride	1/6/95	180.00	µg/L		No
Fluoride	4/10/95	160.00	µg/L		No
Hexavalent Chromium	7/28/93	10.00	µg/L	U	Yes
Hexavalent Chromium	10/19/93	10.00	µg/L	U	Yes
Hexavalent Chromium	1/6/94	10.00	µg/L	U	Yes
Hexavalent Chromium	4/5/94	10.00	µg/L	U	Yes
Hexavalent Chromium	7/12/94	10.00	µg/L	U	Yes
Hexavalent Chromium	7/12/94	10.00	µg/L	U	Yes
Hexavalent Chromium	10/11/94	10.00	µg/L	U	Yes
Hexavalent Chromium	10/11/94	10.00	µg/L	U	Yes
Hexavalent Chromium	1/6/95	10.00	µg/L	U	Yes
Hexavalent Chromium	4/10/95	5.00	µg/L	U	Yes
Iron	1/6/95	83.60	µg/L	BU	Yes
Iron	4/10/95	41.40	µg/L	BU*	Yes
Lead	7/28/93	1.00	µg/L	U	Yes
Lead	10/19/93	1.00	µg/L	UNW	Yes
Lead	1/6/94	4.60	µg/L		Yes
Lead	4/5/94	1.00	µg/L	U	Yes
Lead	7/12/94	3.00	µg/L	NUJ	No
Lead	7/12/94	3.00	µg/L	NUJ	Yes
Lead	7/12/94	3.00	µg/L	NUJ	Yes
Lead	10/11/94	1.70	µg/L	UJ	Yes
Lead	10/11/94	1.70	µg/L	UJ	Yes
Lead	1/6/95	2.80	µg/L	U	Yes
Lead	4/10/95	2.80	µg/L	U	Yes
Magnesium	1/6/95	16,100.00	µg/L		Yes
Magnesium	4/10/95	15,100.00	µg/L		Yes
Manganese	7/28/93	4.00	µg/L	U	Yes
Manganese	10/19/93	4.90	µg/L	B	Yes
Manganese	1/6/94	3.00	µg/L	U	Yes
Manganese	4/5/94	3.00	µg/L	U	Yes
Manganese	7/12/94	1.00	µg/L	U	Yes
Manganese	7/12/94	1.00	µg/L	U	Yes
Manganese	7/12/94	8.00	µg/L	B	No
Manganese	10/11/94	4.00	µg/L	UJ	Yes
Manganese	10/11/94	4.00	µg/L	UJ	Yes
Manganese	1/6/95	6.00	µg/L	U	Yes
Manganese	4/10/95	7.00	µg/L	U	Yes
Mercury	1/6/95	0.10	µg/L	U	Yes
Mercury	4/10/95	0.10	µg/L	U	Yes
Nickel	1/6/95	17.00	µg/L	U	Yes
Nickel	4/10/95	14.00	µg/L	U	Yes
Potassium	1/6/95	2,550.00	µg/L	B	Yes
Potassium	4/10/95	3,240.00	µg/L	BJ	Yes
Selenium	1/6/95	4.90	µg/L	UN	Yes
Selenium	4/10/95	4.90	µg/L	U	Yes
Silver	1/6/95	2.00	µg/L	U	Yes
Silver	4/10/95	2.00	µg/L	U	Yes
Sodium	1/6/95	20,200.00	µg/L		Yes
Sodium	4/10/95	22,300.00	µg/L		Yes
Sr-90	7/28/93	0.07	pCi/mL		No
Sr-90	10/19/93	0.06	pCi/mL		No
Sr-90	1/6/94	0.05	pCi/mL	J	No
Sr-90	4/5/94	0.05	pCi/mL		No

OU 2-12 Post-ROD Contaminant Data

Well : PW-12

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Sr-90	7/12/94	0.04	pCi/mL		No
Sr-90	7/12/94	0.05	pCi/mL		No
Sr-90	10/11/94	0.04	pCi/mL		No
Sr-90	10/11/94	0.04	pCi/mL		No
Sr-90	1/6/95	0.04	pCi/mL		No
Sr-90	4/10/95	0.04	pCi/mL		No
Thallium	1/6/95	7.00	µg/L	U	Yes
Thallium	4/10/95	7.00	µg/L	U	Yes
Tritium	7/28/93	24.10	pCi/mL		No
Tritium	10/19/93	27.40	pCi/mL		No
Tritium	1/6/94	19.00	pCi/mL		No
Tritium	4/5/94	17.00	pCi/mL		No
Tritium	7/12/94	13.20	pCi/mL		No
Tritium	7/12/94	13.60	pCi/mL		No
Tritium	10/11/94	10.70	pCi/mL		No
Tritium	10/11/94	10.90	pCi/mL		No
Tritium	1/6/95	12.80	pCi/mL		No
Tritium	4/10/95	7.07	pCi/mL		No
Vanadium	1/6/95	21.00	µg/L	U	Yes
Vanadium	4/10/95	15.00	µg/L	U	Yes
Zinc	1/6/95	12.00	µg/L	U	Yes
Zinc	4/10/95	5.00	µg/L	U	Yes

Well : USGS-53

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/5/95	31.00	µg/L	UJ	Yes
Aluminum	4/7/95	50.20	µg/L	BU	Yes
Am-241	7/21/93	0.70	pCi/L		No
Am-241	10/19/93	0.40	pCi/L	U	No
Am-241	10/19/93	0.43	pCi/L		No
Am-241	1/7/94	0.00	pCi/L	U	No
Am-241	4/4/94	0.15	pCi/L	U	No
Am-241	7/11/94	0.00	pCi/L	U	No
Am-241	10/10/94	0.04	pCi/L	U	No
Am-241	1/5/95	0.09	pCi/L	U	No
Am-241	4/7/95	0.00	pCi/L	U	No
Antimony	1/5/95	3.00	µg/L	UJ	Yes
Antimony	4/7/95	3.90	µg/L	BU	Yes
Arsenic	7/21/93	13.90	µg/L	N	Yes
Arsenic	10/19/93	8.80	µg/L	B	Yes
Arsenic	10/19/93	9.80	µg/L	B	Yes
Arsenic	1/7/94	8.00	µg/L	BWJ	Yes
Arsenic	4/4/94	5.70	µg/L	BWJ	Yes
Arsenic	7/11/94	11.60	µg/L	J	Yes
Arsenic	10/10/94	5.90	µg/L	BJ	Yes
Arsenic	1/5/95	11.00	µg/L		Yes
Arsenic	4/7/95	7.00	µg/L	U	Yes
Barium	1/5/95	150.00	µg/L	B	Yes
Barium	4/7/95	171.00	µg/L	B	Yes
Beryllium	7/21/93	5.00	µg/L	U	Yes
Beryllium	10/19/93	4.00	µg/L	U	Yes
Beryllium	10/19/93	4.00	µg/L	U	Yes
Beryllium	1/7/94	4.00	µg/L	U	Yes
Beryllium	4/4/94	1.00	µg/L	U	Yes
Beryllium	7/11/94	0.70	µg/L	U	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-53

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Beryllium	10/10/94	0.20	µg/L	UJ	Yes
Beryllium	1/5/95	4.00	µg/L	U	Yes
Beryllium	4/7/95	4.00	µg/L	U	Yes
Cadmium	7/21/93	5.00	µg/L	U	Yes
Cadmium	10/19/93	5.00	µg/L	*UJ	Yes
Cadmium	10/19/93	5.00	µg/L	*UJ	Yes
Cadmium	1/7/94	2.00	µg/L	U	Yes
Cadmium	4/4/94	2.00	µg/L	U	Yes
Cadmium	7/11/94	0.80	µg/L	U	Yes
Cadmium	10/10/94	0.40	µg/L	U	Yes
Cadmium	1/5/95	7.50	µg/L	*UJ	Yes
Cadmium	4/7/95	4.00	µg/L	U	Yes
Calcium	1/5/95	82,000.00	µg/L		Yes
Calcium	4/7/95	110,000.00	µg/L		Yes
Chromium	7/21/93	53.40	µg/L		Yes
Chromium	10/19/93	24.80	µg/L		Yes
Chromium	10/19/93	34.60	µg/L		Yes
Chromium	1/7/94	238.00	µg/L		Yes
Chromium	4/4/94	116.00	µg/L		Yes
Chromium	7/11/94	46.80	µg/L		Yes
Chromium	10/10/94	243.00	µg/L		Yes
Chromium	1/5/95	79.00	µg/L		Yes
Chromium	4/7/95	391.00	µg/L		Yes
Co-60	7/21/93	0.09	pCi/mL		No
Co-60	1/7/94	0.05	pCi/mL		No
Co-60	4/4/94	0.04	pCi/mL		No
Co-60	10/10/94	0.02	pCi/mL		No
Co-60	1/5/95	0.05	pCi/mL		No
Co-60	4/7/95	0.02	pCi/mL		No
Cobalt	7/21/93	17.00	µg/L	U	Yes
Cobalt	10/19/93	7.00	µg/L	UN	Yes
Cobalt	10/19/93	7.00	µg/L	UN	Yes
Cobalt	1/7/94	12.00	µg/L	U	Yes
Cobalt	4/4/94	11.00	µg/L	U	Yes
Cobalt	7/11/94	3.00	µg/L	U	Yes
Cobalt	10/10/94	1.00	µg/L	UJ	Yes
Cobalt	1/5/95	19.00	µg/L	U	Yes
Cobalt	4/7/95	12.00	µg/L	U	Yes
Copper	1/5/95	12.00	µg/L	U	Yes
Copper	4/7/95	12.00	µg/L	U	Yes
Fluoride	7/21/93	220.00	µg/L	J	No
Fluoride	10/19/93	220.00	µg/L		No
Fluoride	10/19/93	230.00	µg/L		No
Fluoride	1/7/94	220.00	µg/L		No
Fluoride	4/4/94	210.00	µg/L		No
Fluoride	7/11/94	220.00	µg/L		No
Fluoride	10/10/94	240.00	µg/L		No
Fluoride	1/5/95	240.00	µg/L		No
Fluoride	4/7/95	170.00	µg/L		No
Gamma	10/19/93		pCi/mL	U	No
Gamma	7/11/94		pCi/mL	U	No
Hexavalent Chromium	7/21/93	53.00	µg/L		Yes
Hexavalent Chromium	10/19/93	33.10	µg/L		Yes
Hexavalent Chromium	10/19/93	35.70	µg/L		Yes
Hexavalent Chromium	1/7/94	227.00	µg/L	J	Yes
Hexavalent Chromium	4/4/94	119.40	µg/L		Yes
Hexavalent Chromium	7/11/94	47.30	µg/L		Yes
Hexavalent Chromium	10/10/94	230.70	µg/L		Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-53

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Hexavalent Chromium	1/5/95	80.60	µg/L		Yes
Hexavalent Chromium	4/7/95	420.00	µg/L		Yes
Iron	1/5/95	53.90	µg/L	BU	Yes
Iron	4/7/95	40.70	µg/L	BU*	Yes
Lead	7/21/93	1.50	µg/L	B	Yes
Lead	10/19/93	1.00	µg/L	UNW	Yes
Lead	10/19/93	1.00	µg/L	UNW	Yes
Lead	1/7/94	1.00	µg/L	UW	Yes
Lead	4/4/94	1.00	µg/L	U	Yes
Lead	7/11/94	3.00	µg/L	NUJ	Yes
Lead	10/10/94	1.70	µg/L	UJ	Yes
Lead	1/5/95	2.80	µg/L	U	Yes
Lead	4/7/95	2.80	µg/L	U	Yes
Magnesium	1/5/95	23,700.00	µg/L		Yes
Magnesium	4/7/95	29,500.00	µg/L		Yes
Manganese	7/21/93	16.60	µg/L		Yes
Manganese	10/19/93	3.00	µg/L	U	Yes
Manganese	10/19/93	3.00	µg/L	U	Yes
Manganese	1/7/94	7.00	µg/L	B	Yes
Manganese	4/4/94	21.20	µg/L		Yes
Manganese	7/11/94	3.70	µg/L	B	Yes
Manganese	10/10/94	4.00	µg/L	UJ	Yes
Manganese	1/5/95	6.00	µg/L	U	Yes
Manganese	4/7/95	36.10	µg/L		Yes
Mercury	1/5/95	0.10	µg/L	BU	Yes
Mercury	4/7/95	0.10	µg/L	U	Yes
Nickel	1/5/95	17.00	µg/L	U	Yes
Nickel	4/7/95	14.00	µg/L	U	Yes
Potassium	1/5/95	2,900.00	µg/L	B	Yes
Potassium	4/7/95	3,920.00	µg/L	BJ	Yes
Selenium	1/5/95	4.90	µg/L	UN	Yes
Selenium	4/7/95	4.90	µg/L	U	Yes
Silver	1/5/95	2.00	µg/L	U	Yes
Silver	4/7/95	2.00	µg/L	U	Yes
Sodium	1/5/95	14,800.00	µg/L		Yes
Sodium	4/7/95	14,000.00	µg/L		Yes
Sr-90	7/21/93	0.10	pCi/mL		No
Sr-90	10/19/93	0.07	pCi/mL		No
Sr-90	10/19/93	0.08	pCi/mL		No
Sr-90	1/7/94	0.13	pCi/mL	J	No
Sr-90	4/4/94	0.14	pCi/mL		No
Sr-90	7/11/94	0.08	pCi/mL		No
Sr-90	10/10/94	0.08	pCi/mL		No
Sr-90	1/5/95	0.12	pCi/mL		No
Sr-90	4/7/95	0.14	pCi/mL		No
Thallium	1/5/95	7.00	µg/L	U	Yes
Thallium	4/7/95	7.00	µg/L	U	Yes
Tritium	7/21/93	390.00	pCi/mL		No
Tritium	10/19/93	42.00	pCi/mL		No
Tritium	10/19/93	43.40	pCi/mL		No
Tritium	1/7/94	246.00	pCi/mL		No
Tritium	4/4/94	210.00	pCi/mL		No
Tritium	7/11/94	36.30	pCi/mL		No
Tritium	10/10/94	158.00	pCi/mL		No
Tritium	1/5/95	208.00	pCi/mL		No
Tritium	4/7/95	151.00	pCi/mL		No
Vanadium	1/5/95	21.00	µg/L	U	Yes
Vanadium	4/7/95	15.00	µg/L	U	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-53

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Zinc	1/5/95	12.00	µg/L	U	Yes
Zinc	4/7/95	5.00	µg/L	U	Yes

Well : USGS-54

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/5/95	31.00	µg/L	UJ	Yes
Aluminum	4/10/95	38.50	µg/L	BU	Yes
Aluminum	4/10/95	56.30	µg/L	BU	Yes
Am-241	7/21/93	0.10	pCi/L	U	No
Am-241	10/19/93	0.00	pCi/L	U	No
Am-241	1/11/94	0.00	pCi/L	U	No
Am-241	4/5/94	0.21	pCi/L	U	No
Am-241	4/5/94	0.40	pCi/L		No
Am-241	7/12/94	0.00	pCi/L	U	No
Am-241	10/10/94	0.00	pCi/L	U	No
Am-241	1/5/95	0.00	pCi/L	U	No
Am-241	4/10/95	0.10	pCi/L	UJ	No
Am-241	4/10/95	0.13	pCi/L	UJ	No
Antimony	1/5/95	3.00	µg/L	UJ	Yes
Antimony	4/10/95	3.00	µg/L	U	Yes
Antimony	4/10/95	3.00	µg/L	U	Yes
Arsenic	7/21/93	14.60	µg/L	BN	Yes
Arsenic	10/19/93	11.60	µg/L		Yes
Arsenic	1/11/94	9.80	µg/L	BW	Yes
Arsenic	4/5/94	10.60	µg/L		Yes
Arsenic	4/5/94	14.30	µg/L	S	Yes
Arsenic	7/12/94	14.60	µg/L	J	Yes
Arsenic	10/10/94	6.70	µg/L	BJ	Yes
Arsenic	1/5/95	7.00	µg/L	U	Yes
Arsenic	4/10/95	7.30	µg/L	B	Yes
Arsenic	4/10/95	7.80	µg/L	B	Yes
Barium	1/5/95	133.00	µg/L	B	Yes
Barium	4/10/95	128.00	µg/L	B	Yes
Barium	4/10/95	134.00	µg/L	B	Yes
Beryllium	7/21/93	5.00	µg/L	U	Yes
Beryllium	10/19/93	4.00	µg/L	U	Yes
Beryllium	1/11/94	4.00	µg/L	U	Yes
Beryllium	4/5/94	1.00	µg/L	U	Yes
Beryllium	4/5/94	1.90	µg/L	BU	Yes
Beryllium	7/12/94	0.70	µg/L	U	Yes
Beryllium	10/10/94	0.20	µg/L	UJ	Yes
Beryllium	1/5/95	4.00	µg/L	U	Yes
Beryllium	4/10/95	4.00	µg/L	U	Yes
Beryllium	4/10/95	4.00	µg/L	U	Yes
Cadmium	7/21/93	5.00	µg/L	U	Yes
Cadmium	10/19/93	5.00	µg/L	*UJ	Yes
Cadmium	1/11/94	2.00	µg/L	U	Yes
Cadmium	4/5/94	2.00	µg/L	U	Yes
Cadmium	4/5/94	2.00	µg/L	U	Yes
Cadmium	7/12/94	0.80	µg/L	U	Yes
Cadmium	10/10/94	0.40	µg/L	U	Yes
Cadmium	1/5/95	5.80	µg/L	*UJ	Yes
Cadmium	4/10/95	4.00	µg/L	U	Yes
Cadmium	4/10/95	4.00	µg/L	U	Yes
Calcium	1/5/95	102,000.00	µg/L		Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-54

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Calcium	4/10/95	118,000.00	µg/L		Yes
Calcium	4/10/95	118,000.00	µg/L		Yes
Chromium	7/21/93	7.10	µg/L	B	Yes
Chromium	10/19/93	6.00	µg/L	U	Yes
Chromium	1/11/94	19.00	µg/L	U	Yes
Chromium	4/5/94	7.00	µg/L	U	Yes
Chromium	4/5/94	7.30	µg/L	B	Yes
Chromium	7/12/94	2.50	µg/L	BJ	Yes
Chromium	10/10/94	9.00	µg/L	U	Yes
Chromium	1/5/95	9.00	µg/L	U	Yes
Chromium	4/10/95	8.00	µg/L	U	Yes
Chromium	4/10/95	8.00	µg/L	U	Yes
Cobalt	7/21/93	17.00	µg/L	U	Yes
Cobalt	10/19/93	7.00	µg/L	UN	Yes
Cobalt	1/11/94	12.00	µg/L	U	Yes
Cobalt	4/5/94	11.00	µg/L	U	Yes
Cobalt	4/5/94	11.00	µg/L	U	Yes
Cobalt	7/12/94	3.00	µg/L	U	Yes
Cobalt	10/10/94	1.00	µg/L	UJ	Yes
Cobalt	1/5/95	19.00	µg/L	U	Yes
Cobalt	4/10/95	12.00	µg/L	U	Yes
Cobalt	4/10/95	12.00	µg/L	U	Yes
Copper	1/5/95	12.00	µg/L	U	Yes
Copper	4/10/95	12.00	µg/L	U	Yes
Copper	4/10/95	12.00	µg/L	U	Yes
Fluoride	7/21/93	220.00	µg/L	J	No
Fluoride	10/19/93	230.00	µg/L		No
Fluoride	1/11/94	190.00	µg/L		No
Fluoride	4/5/94	190.00	µg/L		No
Fluoride	4/5/94	210.00	µg/L		No
Fluoride	7/12/94	230.00	µg/L		No
Fluoride	10/10/94	200.00	µg/L		No
Fluoride	1/5/95	240.00	µg/L		No
Fluoride	4/10/95	150.00	µg/L		No
Fluoride	4/10/95	150.00	µg/L		No
Gamma	7/21/93		pCi/mL	U	No
Gamma	10/19/93		pCi/mL	U	No
Gamma	1/11/94		pCi/mL	U	No
Gamma	4/5/94		pCi/mL	U	No
Gamma	7/12/94		pCi/mL	U	No
Gamma	10/10/94		pCi/mL	U	No
Gamma	1/5/95		pCi/mL	U	No
Gamma	4/10/95		pCi/mL	U	No
Hexavalent Chromium	7/21/93	10.00	µg/L	U	Yes
Hexavalent Chromium	10/19/93	10.00	µg/L	U	Yes
Hexavalent Chromium	1/11/94	10.00	µg/L	U	Yes
Hexavalent Chromium	4/5/94	10.00	µg/L	U	Yes
Hexavalent Chromium	4/5/94	10.00	µg/L	U	Yes
Hexavalent Chromium	7/12/94	10.00	µg/L	U	Yes
Hexavalent Chromium	10/10/94	12.00	µg/L		Yes
Hexavalent Chromium	1/5/95	10.00	µg/L	U	Yes
Hexavalent Chromium	4/10/95	5.00	µg/L	U	Yes
Hexavalent Chromium	4/10/95	5.00	µg/L	U	Yes
Iron	1/5/95	43.20	µg/L	BU	Yes
Iron	4/10/95	28.80	µg/L	BU*	Yes
Iron	4/10/95	83.30	µg/L	BU*	Yes
Lead	7/21/93	1.80	µg/L	B	Yes
Lead	10/19/93	1.00	µg/L	UNW	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-54

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Lead	1/11/94	1.00	µg/L	UW	Yes
Lead	4/5/94	1.00	µg/L	U	Yes
Lead	4/5/94	1.00	µg/L	U	Yes
Lead	7/12/94	3.00	µg/L	NUJ	Yes
Lead	10/10/94	1.70	µg/L	UJ	Yes
Lead	1/5/95	2.80	µg/L	U	Yes
Lead	4/10/95	2.80	µg/L	U	Yes
Lead	4/10/95	2.80	µg/L	U	Yes
Magnesium	1/5/95	30,300.00	µg/L		Yes
Magnesium	4/10/95	32,900.00	µg/L		Yes
Magnesium	4/10/95	33,400.00	µg/L		Yes
Manganese	7/21/93	4.00	µg/L	U	Yes
Manganese	10/19/93	3.00	µg/L	U	Yes
Manganese	1/11/94	3.00	µg/L	U	Yes
Manganese	4/5/94	3.00	µg/L	U	Yes
Manganese	4/5/94	3.00	µg/L	U	Yes
Manganese	7/12/94	1.00	µg/L	U	Yes
Manganese	10/10/94	4.00	µg/L	UJ	Yes
Manganese	1/5/95	6.00	µg/L	U	Yes
Manganese	4/10/95	7.00	µg/L	U	Yes
Manganese	4/10/95	7.00	µg/L	U	Yes
Mercury	1/5/95	0.10	µg/L	U	Yes
Mercury	4/10/95	0.10	µg/L	U	Yes
Mercury	4/10/95	0.10	µg/L	U	Yes
Nickel	1/5/95	17.00	µg/L	U	Yes
Nickel	4/10/95	14.00	µg/L	U	Yes
Nickel	4/10/95	14.00	µg/L	U	Yes
Potassium	1/5/95	3,750.00	µg/L	B	Yes
Potassium	4/10/95	4,560.00	µg/L	BJ	Yes
Potassium	4/10/95	4,640.00	µg/L	BJ	Yes
Selenium	1/5/95	4.90	µg/L	UN	Yes
Selenium	4/10/95	4.90	µg/L	U	Yes
Selenium	4/10/95	4.90	µg/L	U	Yes
Silver	1/5/95	2.00	µg/L	U	Yes
Silver	4/10/95	2.00	µg/L	U	Yes
Silver	4/10/95	2.00	µg/L	U	Yes
Sodium	1/5/95	15,700.00	µg/L		Yes
Sodium	4/10/95	13,900.00	µg/L		Yes
Sodium	4/10/95	14,300.00	µg/L		Yes
Sr-90	7/21/93	0.10	pCi/mL		No
Sr-90	10/19/93	0.10	pCi/mL		No
Sr-90	1/11/94	0.17	pCi/mL	J	No
Sr-90	4/5/94	0.10	pCi/mL		No
Sr-90	4/5/94	0.11	pCi/mL		No
Sr-90	7/12/94	0.08	pCi/mL		No
Sr-90	10/10/94	0.10	pCi/mL		No
Sr-90	1/5/95	0.11	pCi/mL		No
Sr-90	4/10/95	0.11	pCi/mL		No
Sr-90	4/10/95	0.12	pCi/mL		No
Thallium	1/5/95	7.00	µg/L	U	Yes
Thallium	4/10/95	7.00	µg/L	U	Yes
Thallium	4/10/95	7.00	µg/L	U	Yes
Tritium	7/21/93	6.60	pCi/mL		No
Tritium	10/19/93	5.10	pCi/mL		No
Tritium	1/11/94	8.10	pCi/mL		No
Tritium	4/5/94	2.90	pCi/mL		No
Tritium	4/5/94	3.20	pCi/mL		No
Tritium	7/12/94	2.87	pCi/mL		No

OU 2-12 Post-ROD Contaminant Data

Well : USGS-54

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Tritium	10/10/94	5.23	pCi/mL		No
Tritium	1/5/95	4.74	pCi/mL		No
Tritium	4/10/95	2.25	pCi/mL		No
Tritium	4/10/95	2.44	pCi/mL		No
Vanadium	1/5/95	21.00	µg/L	U	Yes
Vanadium	4/10/95	15.00	µg/L	U	Yes
Vanadium	4/10/95	15.00	µg/L	U	Yes
Zinc	1/5/95	12.00	µg/L	U	Yes
Zinc	4/10/95	5.00	µg/L	U	Yes
Zinc	4/10/95	5.00	µg/L	U	Yes

Well : USGS-55

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/5/95	31.00	µg/L	UJ	Yes
Aluminum	4/7/95	48.30	µg/L	BU	Yes
Am-241	7/22/93	0.31	pCi/L		No
Am-241	10/20/93	0.06	pCi/L	U	No
Am-241	1/12/94	0.97	pCi/L		No
Am-241	4/4/94	0.27	pCi/L	U	No
Am-241	7/11/94	0.00	pCi/L	U	No
Am-241	10/10/94	0.00	pCi/L	U	No
Am-241	1/5/95	0.00	pCi/L	U	No
Am-241	4/7/95	0.14	pCi/L	UJ	No
Antimony	1/5/95	3.00	µg/L	UJ	Yes
Antimony	4/7/95	3.00	µg/L	U	Yes
Arsenic	7/22/93	7.20	µg/L	BNU	Yes
Arsenic	10/20/93	6.00	µg/L	B	Yes
Arsenic	1/12/94	5.90	µg/L	BWJ	Yes
Arsenic	4/4/94	4.80	µg/L	B	Yes
Arsenic	7/11/94	6.50	µg/L	BJ	Yes
Arsenic	10/10/94	4.00	µg/L	UJ	Yes
Arsenic	1/5/95	11.70	µg/L		Yes
Arsenic	4/7/95	7.00	µg/L	U	Yes
Barium	1/5/95	90.00	µg/L	B	Yes
Barium	4/7/95	87.60	µg/L	B	Yes
Beryllium	7/22/93	5.00	µg/L		Yes
Beryllium	10/20/93	4.00	µg/L	U	Yes
Beryllium	1/12/94	4.00	µg/L	U	Yes
Beryllium	4/4/94	1.00	µg/L	U	Yes
Beryllium	7/11/94	0.70	µg/L	U	Yes
Beryllium	10/10/94	0.20	µg/L	UJ	Yes
Beryllium	1/5/95	4.00	µg/L	U	Yes
Beryllium	4/7/95	4.00	µg/L	U	Yes
Cadmium	7/22/93	5.00	µg/L	U	Yes
Cadmium	10/20/93	10.40	µg/L	*UJ	Yes
Cadmium	1/12/94	2.00	µg/L	U	Yes
Cadmium	4/4/94	2.00	µg/L	U	Yes
Cadmium	7/11/94	0.80	µg/L	U	Yes
Cadmium	10/10/94	0.40	µg/L	U	Yes
Cadmium	1/5/95	10.00	µg/L	*UJ	Yes
Cadmium	4/7/95	4.00	µg/L	U	Yes
Calcium	1/5/95	73,800.00	µg/L		Yes
Calcium	4/7/95	81,900.00	µg/L		Yes
Chromium	7/22/93	23.20	µg/L		Yes
Chromium	10/20/93	24.90	µg/L		Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-55

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Chromium	1/12/94	72.00	µg/L		Yes
Chromium	4/4/94	53.10	µg/L		Yes
Chromium	7/11/94	64.40	µg/L		Yes
Chromium	10/10/94	82.20	µg/L		Yes
Chromium	1/5/95	63.00	µg/L		Yes
Chromium	4/7/95	39.50	µg/L		Yes
Cobalt	7/22/93	17.00	µg/L	U	Yes
Cobalt	10/20/93	7.00	µg/L	UN	Yes
Cobalt	1/12/94	12.00	µg/L	U	Yes
Cobalt	4/4/94	11.00	µg/L	U	Yes
Cobalt	7/11/94	3.00	µg/L	U	Yes
Cobalt	10/10/94	1.00	µg/L	UJ	Yes
Cobalt	1/5/95	19.00	µg/L	U	Yes
Cobalt	4/7/95	12.00	µg/L	U	Yes
Copper	1/5/95	12.00	µg/L	U	Yes
Copper	4/7/95	12.00	µg/L	U	Yes
Fluoride	7/22/93	210.00	µg/L	J	No
Fluoride	10/20/93	190.00	µg/L		No
Fluoride	1/12/94	210.00	µg/L		No
Fluoride	4/4/94	200.00	µg/L		No
Fluoride	7/11/94	220.00	µg/L		No
Fluoride	10/10/94	210.00	µg/L		No
Fluoride	1/5/95	210.00	µg/L		No
Fluoride	4/7/95	160.00	µg/L		No
Gamma	7/21/93		pCi/mL	U	No
Gamma	10/19/93		pCi/mL	U	No
Gamma	1/11/94		pCi/mL	U	No
Gamma	4/5/94		pCi/mL	U	No
Gamma	7/12/94		pCi/mL	U	No
Gamma	10/10/94		pCi/mL	U	No
Gamma	1/5/95		pCi/mL	U	No
Gamma	4/10/95		pCi/mL	U	No
Hexavalent Chromium	7/22/93	24.00	µg/L		Yes
Hexavalent Chromium	10/20/93	27.40	µg/L		Yes
Hexavalent Chromium	1/12/94	65.00	µg/L		Yes
Hexavalent Chromium	4/4/94	55.20	µg/L		Yes
Hexavalent Chromium	7/11/94	65.10	µg/L		Yes
Hexavalent Chromium	10/11/94	83.50	µg/L		Yes
Hexavalent Chromium	1/5/95	60.70	µg/L		Yes
Hexavalent Chromium	4/7/95	43.00	µg/L		Yes
Iron	1/5/95	36.00	µg/L	BU	Yes
Iron	4/7/95	102.00	µg/L	U*	Yes
Lead	7/22/93	1.40	µg/L	B	Yes
Lead	10/20/93	1.00	µg/L	UNW	Yes
Lead	1/12/94	1.00	µg/L	UW	Yes
Lead	4/4/94	1.00	µg/L	U	Yes
Lead	7/11/94	3.00	µg/L	NUJ	Yes
Lead	10/10/94	1.70	µg/L	UJ	Yes
Lead	1/5/95	2.80	µg/L	U	Yes
Lead	4/7/95	2.80	µg/L	U	Yes
Magnesium	1/5/95	17,600.00	µg/L		Yes
Magnesium	4/7/95	17,900.00	µg/L		Yes
Manganese	7/22/93	6.70	µg/L	B	Yes
Manganese	10/20/93	3.00	µg/L	U	Yes
Manganese	1/12/94	3.00	µg/L	U	Yes
Manganese	4/4/94	3.00	µg/L	U	Yes
Manganese	7/11/94	1.00	µg/L	U	Yes
Manganese	10/10/94	4.00	µg/L	UJ	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-55

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Manganese	1/5/95	6.00	µg/L	U	Yes
Manganese	4/7/95	7.00	µg/L	U	Yes
Mercury	1/5/95	0.10	µg/L	U	Yes
Mercury	4/7/95	0.10	µg/L	U	Yes
Nickel	1/5/95	17.00	µg/L	U	Yes
Nickel	4/7/95	14.00	µg/L	U	Yes
Potassium	1/5/95	3,480.00	µg/L	B	Yes
Potassium	4/7/95	4,330.00	µg/L	BJ	Yes
Selenium	1/5/95	4.90	µg/L	UN	Yes
Selenium	4/7/95	4.90	µg/L	U	Yes
Silver	1/5/95	2.00	µg/L	U	Yes
Silver	4/7/95	2.00	µg/L	U	Yes
Sodium	1/5/95	24,800.00	µg/L		Yes
Sodium	4/7/95	19,800.00	µg/L		Yes
Sr-90	7/22/93	0.01	pCi/mL		No
Sr-90	10/20/93	0.01	pCi/mL		No
Sr-90	1/12/94	0.01	pCi/mL	J	No
Sr-90	4/4/94	0.01	pCi/mL		No
Sr-90	7/11/94	0.01	pCi/mL		No
Sr-90	10/10/94	0.01	pCi/mL		No
Sr-90	1/5/95	0.01	pCi/mL		No
Sr-90	4/7/95	0.01	pCi/mL	J	No
Thallium	1/5/95	7.00	µg/L	U	Yes
Thallium	4/7/95	7.00	µg/L	U	Yes
Tritium	7/22/93	11.00	pCi/mL		No
Tritium	10/20/93	4.00	pCi/mL		No
Tritium	1/12/94	2.60	pCi/mL		No
Tritium	4/4/94	1.80	pCi/mL		No
Tritium	7/11/94	1.25	pCi/mL		No
Tritium	10/10/94	1.15	pCi/mL		No
Tritium	1/5/95	1.73	pCi/mL		No
Tritium	4/7/95	1.22	pCi/mL		No
Vanadium	1/5/95	21.00	µg/L	U	Yes
Vanadium	4/7/95	15.00	µg/L	U	Yes
Zinc	1/5/95	12.00	µg/L	U	Yes
Zinc	4/7/95	5.00	µg/L	U	Yes

Well : USGS-56

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/5/95	31.00	µg/L	UJ	Yes
Aluminum	4/7/95	34.50	µg/L	BU	Yes
Am-241	7/27/93	0.10	pCi/L	U	No
Am-241	10/20/93	0.10	pCi/L	U	No
Am-241	1/12/94	0.00	pCi/L	U	No
Am-241	4/4/94	0.40	pCi/L		No
Am-241	7/11/94	1.00	pCi/L		No
Am-241	10/10/94	0.00	pCi/L	U	No
Am-241	1/5/95	0.00	pCi/L	U	No
Am-241	4/7/95	0.01	pCi/L	U	No
Antimony	1/5/95	3.00	µg/L	UJ	Yes
Antimony	4/7/95	3.00	µg/L	U	Yes
Arsenic	7/27/93	5.10	µg/L	BNU	Yes
Arsenic	10/20/93	3.10	µg/L	B	Yes
Arsenic	1/12/94	2.00	µg/L	UW	Yes
Arsenic	4/4/94	3.00	µg/L	UW	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-56

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Arsenic	7/11/94	6.00	µg/L	UJ	Yes
Arsenic	10/10/94	4.00	µg/L	UJ	Yes
Arsenic	1/5/95	7.00	µg/L	U	Yes
Arsenic	4/7/95	7.00	µg/L	U	Yes
Barium	1/5/95	23.80	µg/L	B	Yes
Barium	4/7/95	25.10	µg/L	B	Yes
Beryllium	7/27/93	5.00	µg/L	U	Yes
Beryllium	10/20/93	4.00	µg/L	U	Yes
Beryllium	1/12/94	4.00	µg/L	U	Yes
Beryllium	4/4/94	5.90	µg/L	U	Yes
Beryllium	7/11/94	0.70	µg/L	U	Yes
Beryllium	10/10/94	0.20	µg/L	UJ	Yes
Beryllium	1/5/95	4.00	µg/L	U	Yes
Beryllium	4/7/95	4.00	µg/L	U	Yes
Cadmium	7/27/93	5.00	µg/L	U	Yes
Cadmium	10/20/93	5.00	µg/L	*UJ	Yes
Cadmium	1/12/94	2.00	µg/L	U	Yes
Cadmium	4/4/94	2.00	µg/L	U	Yes
Cadmium	7/11/94	0.80	µg/L	U	Yes
Cadmium	10/10/94	0.40	µg/L	U	Yes
Cadmium	1/5/95	2.00	µg/L	*UJ	Yes
Cadmium	4/7/95	4.00	µg/L	U	Yes
Calcium	1/5/95	144,000.00	µg/L		Yes
Calcium	4/7/95	156,000.00	µg/L		Yes
Chromium	7/27/93	245.00	µg/L		Yes
Chromium	10/20/93	136.00	µg/L		Yes
Chromium	1/12/94	73.00	µg/L		Yes
Chromium	4/4/94	109.00	µg/L		Yes
Chromium	7/11/94	130.00	µg/L		Yes
Chromium	10/10/94	59.50	µg/L		Yes
Chromium	1/5/95	83.00	µg/L		Yes
Chromium	4/7/95	66.90	µg/L		Yes
Co-60	7/27/93	0.24	pCi/mL		No
Co-60	10/20/93	1.01	pCi/mL		No
Co-60	1/12/94	0.04	pCi/mL		No
Co-60	4/4/94	0.10	pCi/mL		No
Co-60	4/7/94	0.07	pCi/mL		No
Co-60	7/11/94	0.27	pCi/mL		No
Co-60	10/10/94	0.05	pCi/mL		No
Co-60	1/5/95	0.07	pCi/mL		No
Cobalt	7/27/93	17.00	µg/L	U	Yes
Cobalt	10/20/93	7.00	µg/L	UN	Yes
Cobalt	1/12/94	12.00	µg/L	U	Yes
Cobalt	4/4/94	11.00	µg/L	U	Yes
Cobalt	7/11/94	3.00	µg/L	U	Yes
Cobalt	10/10/94	1.00	µg/L	UJ	Yes
Cobalt	1/5/95	19.00	µg/L	U	Yes
Cobalt	4/7/95	12.00	µg/L	U	Yes
Copper	1/5/95	12.00	µg/L	U	Yes
Copper	4/7/95	12.00	µg/L	U	Yes
Fluoride	7/27/93	120.00	µg/L	J	No
Fluoride	10/20/93	160.00	µg/L		No
Fluoride	1/12/94	110.00	µg/L		No
Fluoride	4/4/94	140.00	µg/L		No
Fluoride	7/11/94	160.00	µg/L		No
Fluoride	10/10/94	120.00	µg/L		No
Fluoride	1/5/95	170.00	µg/L		No
Fluoride	4/7/95	150.00	µg/L		No

OU 2-12 Post-ROD Contaminant Data

Well : USGS-56

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Hexavalent Chromium	7/27/93	244.00	µg/L	J	Yes
Hexavalent Chromium	10/20/93	136.30	µg/L		Yes
Hexavalent Chromium	1/12/94	69.00	µg/L		Yes
Hexavalent Chromium	4/4/94	114.40	µg/L		Yes
Hexavalent Chromium	7/11/94	135.00	µg/L		Yes
Hexavalent Chromium	10/10/94	60.20	µg/L		Yes
Hexavalent Chromium	1/5/95	86.60	µg/L		Yes
Hexavalent Chromium	4/7/95	80.00	µg/L		Yes
Iron	1/5/95	85.80	µg/L	BU	Yes
Iron	4/7/95	26.00	µg/L	U*	Yes
Lead	7/27/93	4.80	µg/L	W	Yes
Lead	10/20/93	1.00	µg/L	UNW	Yes
Lead	1/12/94	1.00	µg/L	UW	Yes
Lead	4/4/94	1.00	µg/L	U	Yes
Lead	7/11/94	3.00	µg/L	NUJ	Yes
Lead	10/10/94	1.70	µg/L	UJ	Yes
Lead	1/5/95	2.80	µg/L	U	Yes
Lead	4/7/95	2.80	µg/L	U	Yes
Magnesium	1/5/95	33,200.00	µg/L		Yes
Magnesium	4/7/95	31,300.00	µg/L		Yes
Manganese	7/27/93	4.00	µg/L	U	Yes
Manganese	10/20/93	3.00	µg/L	U	Yes
Manganese	1/12/94	3.00	µg/L	U	Yes
Manganese	4/4/94	3.00	µg/L	U	Yes
Manganese	7/11/94	1.00	µg/L	U	Yes
Manganese	10/10/94	4.00	µg/L	UJ	Yes
Manganese	1/5/95	6.00	µg/L	U	Yes
Manganese	4/7/95	7.00	µg/L	U	Yes
Mercury	1/5/95	0.10	µg/L	U	Yes
Mercury	4/7/95	0.10	µg/L	U	Yes
Nickel	1/5/95	17.00	µg/L	U	Yes
Nickel	4/7/95	14.00	µg/L	U	Yes
Potassium	1/5/95	3,400.00	µg/L	B	Yes
Potassium	4/7/95	4,170.00	µg/L	BJ	Yes
Selenium	1/5/95	4.90	µg/L	UN	Yes
Selenium	4/7/95	4.90	µg/L	U	Yes
Silver	1/5/95	2.00	µg/L	U	Yes
Silver	4/7/95	2.00	µg/L	U	Yes
Sodium	1/5/95	76,700.00	µg/L		Yes
Sodium	4/7/95	55,800.00	µg/L		Yes
Sr-90	7/27/93	0.18	pCi/mL		No
Sr-90	10/20/93	0.07	pCi/mL		No
Sr-90	1/12/94	0.09	pCi/mL	J	No
Sr-90	4/4/94	0.07	pCi/mL		No
Sr-90	7/11/94	0.05	pCi/mL		No
Sr-90	10/10/94	0.08	pCi/mL		No
Sr-90	1/5/95	0.06	pCi/mL		No
Sr-90	4/7/95	0.05	pCi/mL		No
Thallium	1/5/95	7.00	µg/L	U	Yes
Thallium	4/7/95	7.00	µg/L	U	Yes
Tritium	7/27/93	237.00	pCi/mL		No
Tritium	10/20/93	746.00	pCi/mL		No
Tritium	1/12/94	87.20	pCi/mL		No
Tritium	4/4/94	500.00	pCi/mL		No
Tritium	7/11/94	463.00	pCi/mL		No
Tritium	10/10/94	69.40	pCi/mL		No
Tritium	1/5/95	534.00	pCi/mL		No
Tritium	4/7/95	637.00	pCi/mL		No

OU 2-12 Post-ROD Contaminant Data

Well : USGS-56

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Vanadium	1/5/95	21.00	µg/L	U	Yes
Vanadium	4/7/95	15.00	µg/L	U	Yes
Zinc	1/5/95	12.00	µg/L	U	Yes
Zinc	4/7/95	5.00	µg/L	U	Yes

Well : TRA-7

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/9/95	31.00	µg/L	UJ	Yes
Aluminum	1/9/95	31.00	µg/L	UJ	Yes
Am-241	7/27/93	0.00	pCi/L	U	No
Am-241	7/27/93	0.03	pCi/L	U	No
Am-241	1/7/94	0.13	pCi/L	U	No
Am-241	7/14/94	0.00	pCi/L	U	No
Am-241	1/9/95	0.00	pCi/L	U	No
Am-241	1/9/95	0.00	pCi/L	U	No
Antimony	1/9/95	3.00	µg/L	UJ	Yes
Antimony	1/9/95	3.00	µg/L	UJ	Yes
Arsenic	7/27/93	2.00	µg/L	UWN	No
Arsenic	7/27/93	2.00	µg/L	UWN	No
Arsenic	7/27/93	2.00	µg/L	UWN	Yes
Arsenic	7/27/93	2.00	µg/L	UWN	Yes
Arsenic	1/10/94	2.00	µg/L	UW	No
Arsenic	1/10/94	2.00	µg/L	UW	Yes
Arsenic	7/14/94	6.00	µg/L	UJ	No
Arsenic	7/14/94	6.00	µg/L	UJ	Yes
Arsenic	1/9/95	7.00	µg/L	U	Yes
Arsenic	1/9/95	7.00	µg/L	U	Yes
Barium	1/9/95	120.00	µg/L	B	Yes
Barium	1/9/95	127.00	µg/L	B	Yes
Beryllium	7/27/93	5.00	µg/L	U	No
Beryllium	7/27/93	5.00	µg/L	U	No
Beryllium	7/27/93	5.00	µg/L	U	Yes
Beryllium	7/27/93	5.00	µg/L	U	Yes
Beryllium	1/10/94	4.00	µg/L	U	No
Beryllium	1/10/94	4.00	µg/L	U	Yes
Beryllium	7/14/94	0.70	µg/L	U	No
Beryllium	7/14/94	0.70	µg/L	U	Yes
Beryllium	1/9/95	4.00	µg/L	U	Yes
Beryllium	1/9/95	4.00	µg/L	U	Yes
Cadmium	7/27/93	5.00	µg/L	U	No
Cadmium	7/27/93	5.00	µg/L	U	No
Cadmium	7/27/93	5.00	µg/L	U	Yes
Cadmium	7/27/93	5.00	µg/L	U	Yes
Cadmium	1/10/94	2.00	µg/L	U	No
Cadmium	1/10/94	2.00	µg/L	U	Yes
Cadmium	7/14/94	0.80	µg/L	U	No
Cadmium	7/14/94	0.80	µg/L	U	Yes
Cadmium	1/9/95	2.00	µg/L	*UJ	Yes
Cadmium	1/9/95	2.00	µg/L	*UJ	Yes
Calcium	1/9/95	76,900.00	µg/L		Yes
Calcium	1/9/95	80,800.00	µg/L		Yes
Chromium	7/27/93	194.00	µg/L		Yes
Chromium	7/27/93	201.00	µg/L		Yes
Chromium	7/27/93	208.00	µg/L		No
Chromium	7/27/93	321.00	µg/L		No

OU 2-12 Post-ROD Contaminant Data

Well : TRA-7

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Chromium	1/10/94	195.00	µg/L		Yes
Chromium	1/10/94	204.00	µg/L		No
Chromium	7/14/94	190.00	µg/L		Yes
Chromium	7/14/94	242.00	µg/L		No
Chromium	1/9/95	186.00	µg/L		Yes
Chromium	1/9/95	195.00	µg/L		Yes
Cobalt	7/27/93	17.00	µg/L	U	No
Cobalt	7/27/93	17.00	µg/L	U	No
Cobalt	7/27/93	17.00	µg/L	U	Yes
Cobalt	7/27/93	17.00	µg/L	U	Yes
Cobalt	1/10/94	12.00	µg/L	U	No
Cobalt	1/10/94	12.00	µg/L	U	Yes
Cobalt	7/14/94	3.00	µg/L	U	No
Cobalt	7/14/94	3.00	µg/L	U	Yes
Cobalt	1/9/95	19.00	µg/L	U	Yes
Cobalt	1/9/95	19.00	µg/L	U	Yes
Copper	1/9/95	12.00	µg/L	U	Yes
Copper	1/9/95	12.00	µg/L	U	Yes
Fluoride	7/27/93	170.00	µg/L	J	No
Fluoride	7/27/93	170.00	µg/L	J	No
Fluoride	1/10/94	180.00	µg/L		No
Fluoride	7/14/94	170.00	µg/L		No
Fluoride	1/9/95	170.00	µg/L		No
Fluoride	1/9/95	170.00	µg/L		No
Gamma	7/27/93		pCi/mL	U	No
Gamma	1/7/94		pCi/mL	U	No
Gamma	7/14/94		pCi/mL	U	No
Gamma	1/9/95		pCi/mL	U	No
Hexavalent Chromium	7/27/93	197.00	µg/L	J	No
Hexavalent Chromium	7/27/93	200.00	µg/L	J	Yes
Hexavalent Chromium	7/27/93	202.00	µg/L	J	Yes
Hexavalent Chromium	7/27/93	206.00	µg/L	J	No
Hexavalent Chromium	1/10/94	183.00	µg/L		No
Hexavalent Chromium	1/10/94	184.00	µg/L		Yes
Hexavalent Chromium	7/14/94	186.00	µg/L		Yes
Hexavalent Chromium	1/9/95	178.10	µg/L		Yes
Hexavalent Chromium	1/9/95	181.70	µg/L		Yes
Iron	1/9/95	36.80	µg/L	BU	Yes
Iron	1/9/95	41.90	µg/L	BU	Yes
Lead	7/27/93	1.00	µg/L	U	Yes
Lead	7/27/93	1.00	µg/L	U	Yes
Lead	7/27/93	2.20	µg/L	B	No
Lead	7/27/93	2.60	µg/L	B	No
Lead	1/10/94	1.00	µg/L	UW	Yes
Lead	1/10/94	1.20	µg/L	BWJ	No
Lead	7/14/94	3.00	µg/L	NUJ	No
Lead	7/14/94	3.00	µg/L	NUJ	Yes
Lead	1/9/95	2.80	µg/L	U	Yes
Lead	1/9/95	2.80	µg/L	U	Yes
Magnesium	1/9/95	19,300.00	µg/L		Yes
Magnesium	1/9/95	20,300.00	µg/L		Yes
Manganese	7/27/93	4.00	µg/L	B	Yes
Manganese	7/27/93	4.00	µg/L	B	Yes
Manganese	7/27/93	8.00	µg/L	B	No
Manganese	7/27/93	15.00	µg/L		No
Manganese	1/10/94	3.00	µg/L	U	Yes
Manganese	1/10/94	7.00	µg/L	B	No
Manganese	7/14/94	3.80	µg/L	B	Yes

OU 2-12 Post-ROD Contaminant Data

Well : TRA-7

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Manganese	7/14/94	8.20	µg/L	B	No
Manganese	1/9/95	6.00	µg/L	U	Yes
Manganese	1/9/95	6.00	µg/L	U	Yes
Mercury	1/9/95	0.10	µg/L	U	Yes
Mercury	1/9/95	0.10	µg/L	U	Yes
Nickel	1/9/95	17.00	µg/L	U	Yes
Nickel	1/9/95	17.00	µg/L	U	Yes
Potassium	1/9/95	2,890.00	µg/L	B	Yes
Potassium	1/9/95	3,000.00	µg/L	B	Yes
Selenium	1/9/95	4.90	µg/L	UN	Yes
Selenium	1/9/95	4.90	µg/L	UN	Yes
Silver	1/9/95	2.00	µg/L	U	Yes
Silver	1/9/95	2.00	µg/L	U	Yes
Sodium	1/9/95	12,600.00	µg/L		Yes
Sodium	1/9/95	13,400.00	µg/L		Yes
Sr-90	7/27/93	0.00	pCi/mL	U	No
Sr-90	7/27/93	0.00	pCi/mL	U	No
Sr-90	1/7/94	0.00	pCi/mL	UJ	No
Sr-90	7/14/94	0.00	pCi/mL	U	No
Sr-90	1/9/95	0.00	pCi/mL	U	No
Sr-90	1/9/95	0.00	pCi/mL	U	No
Thallium	1/9/95	7.00	µg/L	U	Yes
Thallium	1/9/95	7.00	µg/L	U	Yes
Tritium	7/27/93	30.30	pCi/mL		No
Tritium	7/27/93	30.80	pCi/mL		No
Tritium	1/7/94	31.00	pCi/mL		No
Tritium	7/14/94	30.40	pCi/mL		No
Tritium	1/9/95	37.00	pCi/mL		No
Tritium	1/9/95	37.60	pCi/mL		No
Vanadium	1/9/95	21.00	µg/L	U	Yes
Vanadium	1/9/95	21.00	µg/L	U	Yes
Zinc	1/9/95	12.00	µg/L	U	Yes
Zinc	1/9/95	12.00	µg/L	U	Yes

Well : USGS-58

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/9/95	31.00	µg/L	UJ	Yes
Am-241	7/26/93	0.00	pCi/L	U	No
Am-241	1/11/94	0.00	pCi/L	U	No
Am-241	7/13/94	0.05	pCi/L	U	No
Am-241	1/9/95	0.00	pCi/L	U	No
Antimony	1/9/95	3.00	µg/L	UJ	Yes
Arsenic	7/26/93	2.60	µg/L	BNU	Yes
Arsenic	7/26/93	8.10	µg/L	BWNU	No
Arsenic	1/11/94	2.00	µg/L	UW	No
Arsenic	1/11/94	2.00	µg/L	UW	Yes
Arsenic	7/13/94	6.00	µg/L	UJ	No
Arsenic	7/13/94	6.00	µg/L	UJ	Yes
Arsenic	1/9/95	7.00	µg/L	U	Yes
Barium	1/9/95	75.10	µg/L	B	Yes
Beryllium	7/26/93	5.00	µg/L	U	No
Beryllium	7/26/93	5.00	µg/L	U	Yes
Beryllium	1/11/94	4.00	µg/L	U	No
Beryllium	1/11/94	4.00	µg/L	U	Yes
Beryllium	7/13/94	0.70	µg/L	U	No

OU 2-12 Post-ROD Contaminant Data

Well : USGS-58

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Beryllium	7/13/94	0.70	µg/L	U	Yes
Beryllium	1/9/95	4.00	µg/L	U	Yes
Cadmium	7/26/93	5.00	µg/L	U	No
Cadmium	7/26/93	5.00	µg/L	U	Yes
Cadmium	1/11/94	2.00	µg/L	U	No
Cadmium	1/11/94	2.00	µg/L	U	Yes
Cadmium	7/13/94	0.80	µg/L	U	No
Cadmium	7/13/94	0.80	µg/L	U	Yes
Cadmium	1/9/95	3.50	µg/L	B*UJ	Yes
Calcium	1/9/95	55,600.00	µg/L		Yes
Chromium	7/26/93	9.00	µg/L	B	No
Chromium	7/26/93	12.00	µg/L		Yes
Chromium	1/11/94	15.00	µg/L	U	No
Chromium	1/11/94	16.00	µg/L	U	Yes
Chromium	7/13/94	6.20	µg/L	BJ	No
Chromium	7/13/94	6.40	µg/L	BJ	Yes
Chromium	1/9/95	9.00	µg/L	U	Yes
Cobalt	7/26/93	17.00	µg/L	U	No
Cobalt	7/26/93	17.00	µg/L	U	Yes
Cobalt	1/11/94	12.00	µg/L	U	No
Cobalt	1/11/94	12.00	µg/L	U	Yes
Cobalt	7/13/94	3.00	µg/L	U	No
Cobalt	7/13/94	3.00	µg/L	U	Yes
Cobalt	1/9/95	19.00	µg/L	U	Yes
Copper	1/9/95	12.00	µg/L	U	Yes
Fluoride	7/26/93	130.00	µg/L	J	No
Fluoride	1/11/94	130.00	µg/L		No
Fluoride	7/13/94	140.00	µg/L		No
Fluoride	1/9/95	140.00	µg/L		No
Gamma	7/26/93		pCi/mL	U	No
Gamma	1/11/94		pCi/mL	U	No
Gamma	7/13/94		pCi/mL	U	No
Gamma	1/9/95		pCi/mL	U	No
Hexavalent Chromium	7/26/93	11.00	µg/L		Yes
Hexavalent Chromium	7/26/93	12.00	µg/L		No
Hexavalent Chromium	1/11/94	10.00	µg/L	U	No
Hexavalent Chromium	1/11/94	10.00	µg/L	U	Yes
Hexavalent Chromium	7/13/94	10.00	µg/L	U	Yes
Hexavalent Chromium	1/9/95	12.90	µg/L		Yes
Iron	1/9/95	116.00	µg/L	U	Yes
Lead	7/26/93	1.50	µg/L	B	Yes
Lead	7/26/93	5.60	µg/L		No
Lead	1/11/94	1.00	µg/L	UW	No
Lead	1/11/94	1.00	µg/L	UW	Yes
Lead	7/13/94	3.00	µg/L	NUJ	No
Lead	7/13/94	3.00	µg/L	NUJ	Yes
Lead	1/9/95	2.80	µg/L	U	Yes
Magnesium	1/9/95	18,600.00	µg/L		Yes
Manganese	7/26/93	4.00	µg/L	U	No
Manganese	7/26/93	4.00	µg/L	U	Yes
Manganese	1/11/94	3.00	µg/L	U	No
Manganese	1/11/94	3.00	µg/L	U	Yes
Manganese	7/13/94	1.00	µg/L	U	No
Manganese	7/13/94	1.00	µg/L	U	Yes
Manganese	1/9/95	6.00	µg/L	U	Yes
Mercury	1/9/95	0.10	µg/L	U	Yes
Nickel	1/9/95	17.00	µg/L	U	Yes
Potassium	1/9/95	1,740.00	µg/L	B	Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-58

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Selenium	1/9/95	4.90	µg/L	UN	Yes
Silver	1/9/95	2.00	µg/L	U	Yes
Sodium	1/9/95	10,700.00	µg/L		Yes
Sr-90	7/26/93	0.00	pCi/mL		No
Sr-90	1/11/94	0.00	pCi/mL	UJ	No
Sr-90	7/13/94	0.00	pCi/mL	U	No
Sr-90	1/9/95	0.00	pCi/mL	U	No
Thallium	1/9/95	7.00	µg/L	U	Yes
Tritium	7/26/93	4.20	pCi/mL		No
Tritium	1/11/94	4.60	pCi/mL		No
Tritium	7/13/94	4.46	pCi/mL		No
Tritium	1/9/95	5.59	pCi/mL		No
Vanadium	1/9/95	21.00	µg/L	U	Yes
Zinc	1/9/95	59.40	µg/L		Yes

Well : USGS-65

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Aluminum	1/9/95	31.00	µg/L	UJ	Yes
Am-241	7/26/93	0.00	pCi/L	U	No
Am-241	1/10/94	0.13	pCi/L	U	No
Am-241	1/10/94	0.32	pCi/L	U	No
Am-241	7/13/94	0.00	pCi/L	U	No
Am-241	1/9/95	0.00	pCi/L	U	No
Antimony	1/9/95	3.00	µg/L	UJ	Yes
Arsenic	7/26/93	2.00	µg/L	UWN	No
Arsenic	7/26/93	4.50	µg/L	BWNU	Yes
Arsenic	1/10/94	2.00	µg/L	UW	No
Arsenic	1/10/94	2.00	µg/L	UW	No
Arsenic	1/10/94	2.00	µg/L	UW	Yes
Arsenic	1/10/94	2.00	µg/L	UW	Yes
Arsenic	7/13/94	6.00	µg/L	UJ	No
Arsenic	7/13/94	6.00	µg/L	UJ	Yes
Arsenic	1/9/95	7.00	µg/L	U	Yes
Barium	1/9/95	56.10	µg/L	B	Yes
Beryllium	7/26/93	5.00	µg/L	U	No
Beryllium	7/26/93	5.00	µg/L	U	Yes
Beryllium	1/10/94	4.00	µg/L	U	No
Beryllium	1/10/94	4.00	µg/L	U	No
Beryllium	1/10/94	4.00	µg/L	U	Yes
Beryllium	1/10/94	4.00	µg/L	U	Yes
Beryllium	7/13/94	0.70	µg/L	U	No
Beryllium	7/13/94	0.70	µg/L	U	Yes
Beryllium	1/9/95	4.00	µg/L	U	Yes
Cadmium	7/26/93	5.00	µg/L	U	No
Cadmium	7/26/93	5.00	µg/L	U	Yes
Cadmium	1/10/94	2.00	µg/L	U	No
Cadmium	1/10/94	2.00	µg/L	U	No
Cadmium	1/10/94	2.00	µg/L	U	Yes
Cadmium	1/10/94	2.50	µg/L	B	Yes
Cadmium	7/13/94	0.80	µg/L	U	No
Cadmium	7/13/94	0.80	µg/L	U	Yes
Cadmium	1/9/95	7.20	µg/L	*UJ	Yes
Calcium	1/9/95	82,800.00	µg/L		Yes
Chromium	7/26/93	173.00	µg/L		No
Chromium	7/26/93	187.00	µg/L		Yes

OU 2-12 Post-ROD Contaminant Data

Well : USGS-65

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Chromium	1/10/94	159.00	µg/L		No
Chromium	1/10/94	160.00	µg/L		No
Chromium	1/10/94	163.00	µg/L		Yes
Chromium	1/10/94	163.00	µg/L		Yes
Chromium	7/13/94	172.00	µg/L		Yes
Chromium	7/13/94	183.00	µg/L		No
Chromium	1/9/95	179.00	µg/L		Yes
Cobalt	7/26/93	17.00	µg/L	U	No
Cobalt	7/26/93	17.00	µg/L	U	Yes
Cobalt	1/10/94	12.00	µg/L	U	No
Cobalt	1/10/94	12.00	µg/L	U	No
Cobalt	1/10/94	12.00	µg/L	U	Yes
Cobalt	1/10/94	12.00	µg/L	U	Yes
Cobalt	7/13/94	3.00	µg/L	U	No
Cobalt	7/13/94	3.00	µg/L	U	Yes
Cobalt	1/9/95	19.00	µg/L	U	Yes
Copper	1/9/95	12.00	µg/L	U	Yes
Fluoride	7/26/93	150.00	µg/L	J	No
Fluoride	1/10/94	150.00	µg/L		No
Fluoride	1/10/94	170.00	µg/L		No
Fluoride	7/13/94	170.00	µg/L		No
Fluoride	1/9/95	150.00	µg/L		No
Gamma	7/26/93		pCi/mL	U	No
Gamma	1/10/94		pCi/mL	U	No
Gamma	7/13/94		pCi/mL	U	No
Gamma	1/9/95		pCi/mL	U	No
Hexavalent Chromium	7/26/93	192.00	µg/L	J	Yes
Hexavalent Chromium	7/26/93	193.00	µg/L	J	No
Hexavalent Chromium	1/10/94	159.00	µg/L		Yes
Hexavalent Chromium	1/10/94	160.00	µg/L		No
Hexavalent Chromium	1/10/94	161.00	µg/L		No
Hexavalent Chromium	1/10/94	161.00	µg/L		Yes
Hexavalent Chromium	7/13/94	172.00	µg/L		Yes
Hexavalent Chromium	1/9/95	180.80	µg/L		Yes
Lead	7/26/93	4.60	µg/L		No
Lead	7/26/93	4.60	µg/L		Yes
Lead	1/10/94	2.90	µg/L	B	Yes
Lead	1/10/94	3.00	µg/L	W	No
Lead	1/10/94	3.00	µg/L	WJ	No
Lead	1/10/94	3.70	µg/L		Yes
Lead	7/13/94	3.00	µg/L	NUJ	No
Lead	7/13/94	3.30	µg/L	NJ	Yes
Lead	1/9/95	2.80	µg/L	U	Yes
Magnesium	1/9/95	18,500.00	µg/L		Yes
Manganese	7/26/93	4.00	µg/L	U	No
Manganese	7/26/93	4.00	µg/L	U	Yes
Manganese	1/10/94	3.00	µg/L	B	Yes
Manganese	1/10/94	3.00	µg/L	U	No
Manganese	1/10/94	3.00	µg/L	U	No
Manganese	1/10/94	3.00	µg/L	U	Yes
Manganese	7/13/94	1.00	µg/L	U	No
Manganese	7/13/94	1.00	µg/L	U	Yes
Manganese	1/9/95	6.00	µg/L	U	Yes
Mercury	1/9/95	0.10	µg/L	U	Yes
Nickel	1/9/95	17.00	µg/L	U	Yes
Potassium	1/9/95	3,100.00	µg/L	B	Yes
Selenium	1/9/95	4.90	µg/L	UN	Yes
Silver	1/9/95	2.00	µg/L	U	Yes

OU 2-12 Post-ROD Contaminant Data

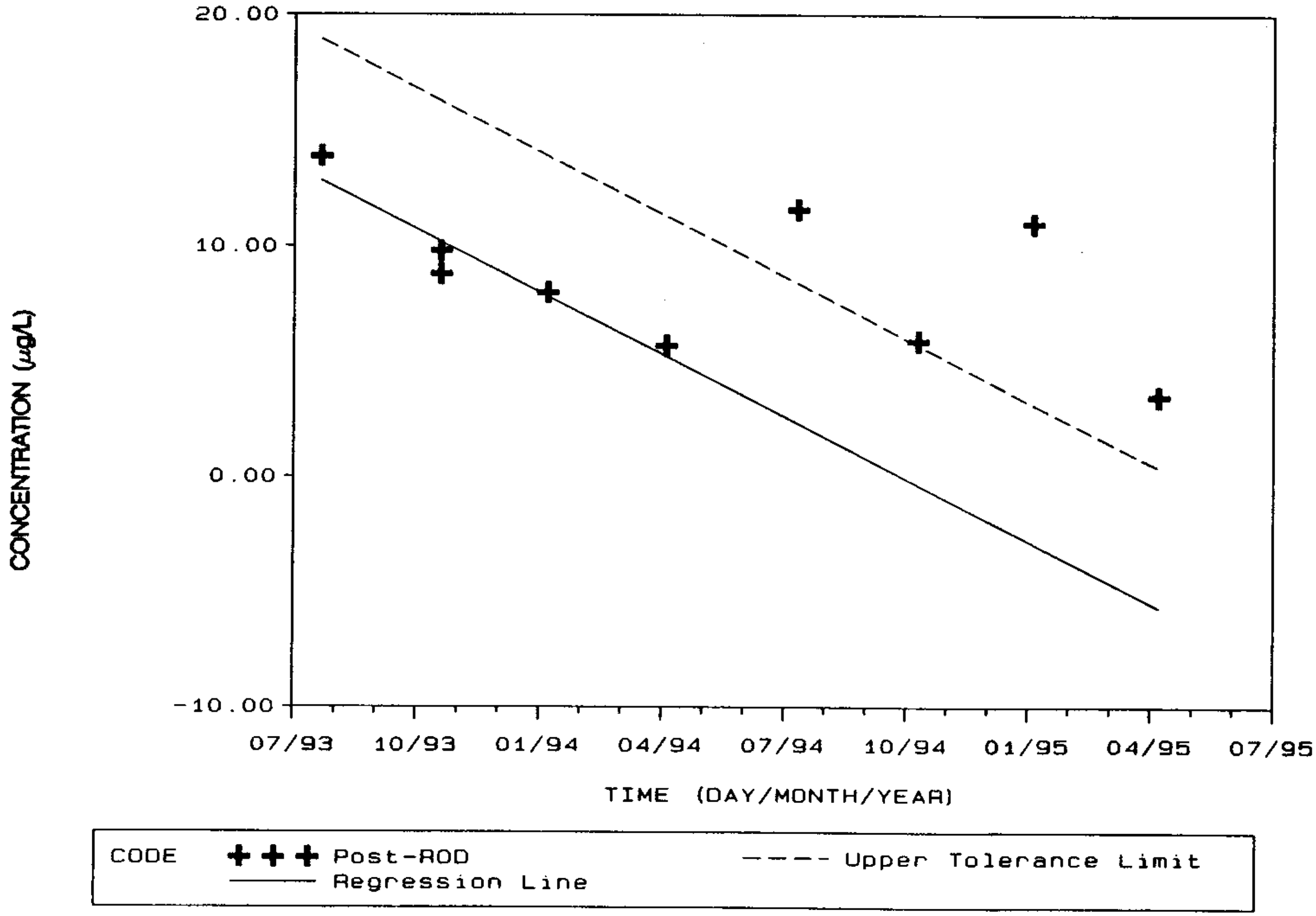
Well : USGS-65

Contaminant	Sample Date	Concentration	Units	Qual Flags	Filtered?
Sodium	1/9/95	14,900.00	µg/L		Yes
Sr-90	7/26/93	0.00	pCi/mL		No
Sr-90	1/10/94	0.00	pCi/mL	UJ	No
Sr-90	1/10/94	0.00	pCi/mL	UJ	No
Sr-90	7/13/94	0.00	pCi/mL	U	No
Sr-90	1/9/95	0.00	pCi/mL	U	No
Thallium	1/9/95	7.00	µg/L	U	Yes
Tritium	7/26/93	28.20	pCi/mL		No
Tritium	1/10/94	26.60	pCi/mL		No
Tritium	1/10/94	27.40	pCi/mL		No
Tritium	7/13/94	24.80	pCi/mL		No
Tritium	1/9/95	28.60	pCi/mL		No
Vanadium	1/9/95	21.00	µg/L	U	Yes
Zinc	1/9/95	184.00	µg/L		Yes

Appendix D - OU 2-12 Contaminant Plots

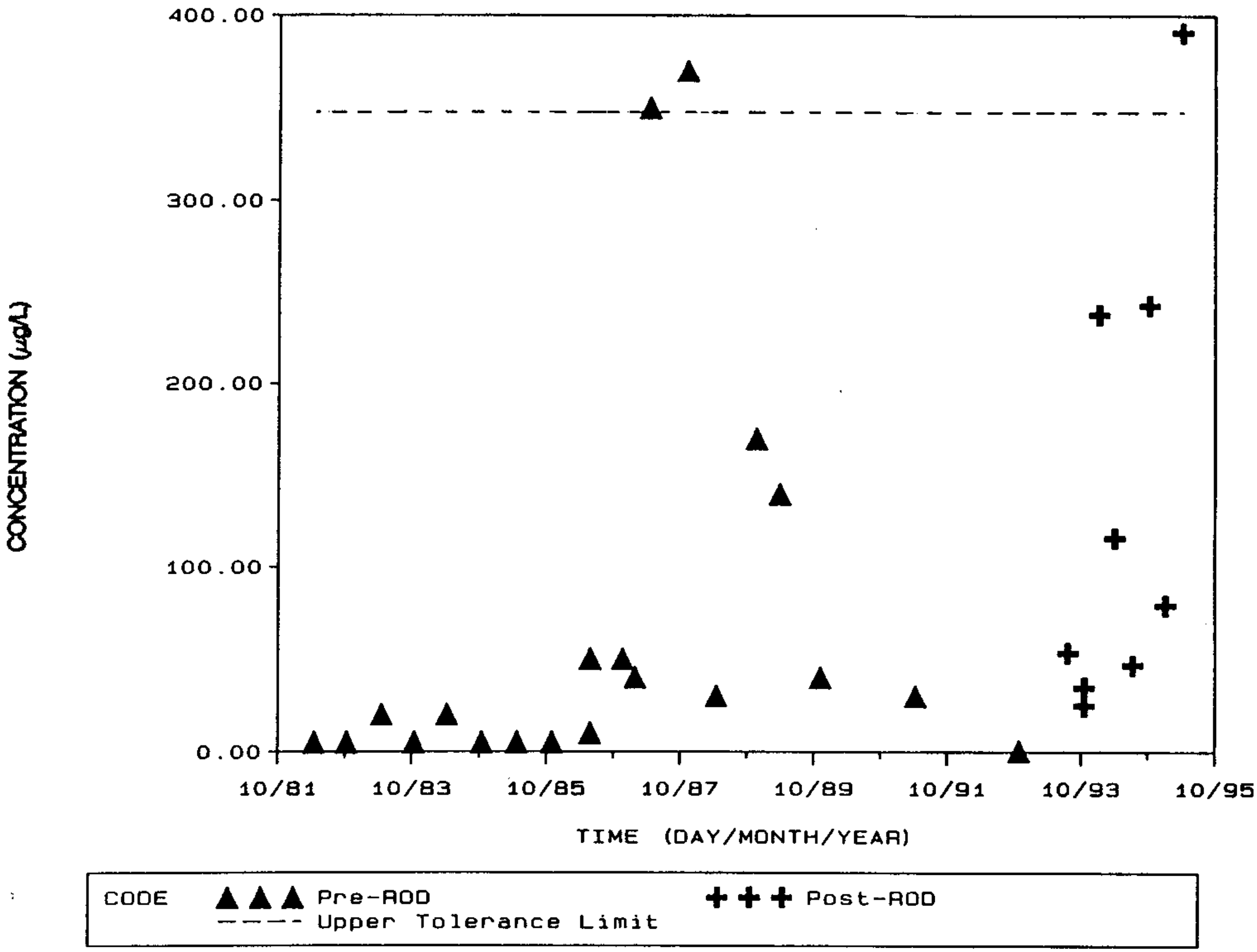
Concentration versus time plots for contaminant of concern results from the OU 2-12 wells are included for each contaminant with a sufficient number of data points to calculate upper tolerance limits, as discussed in Section 5.

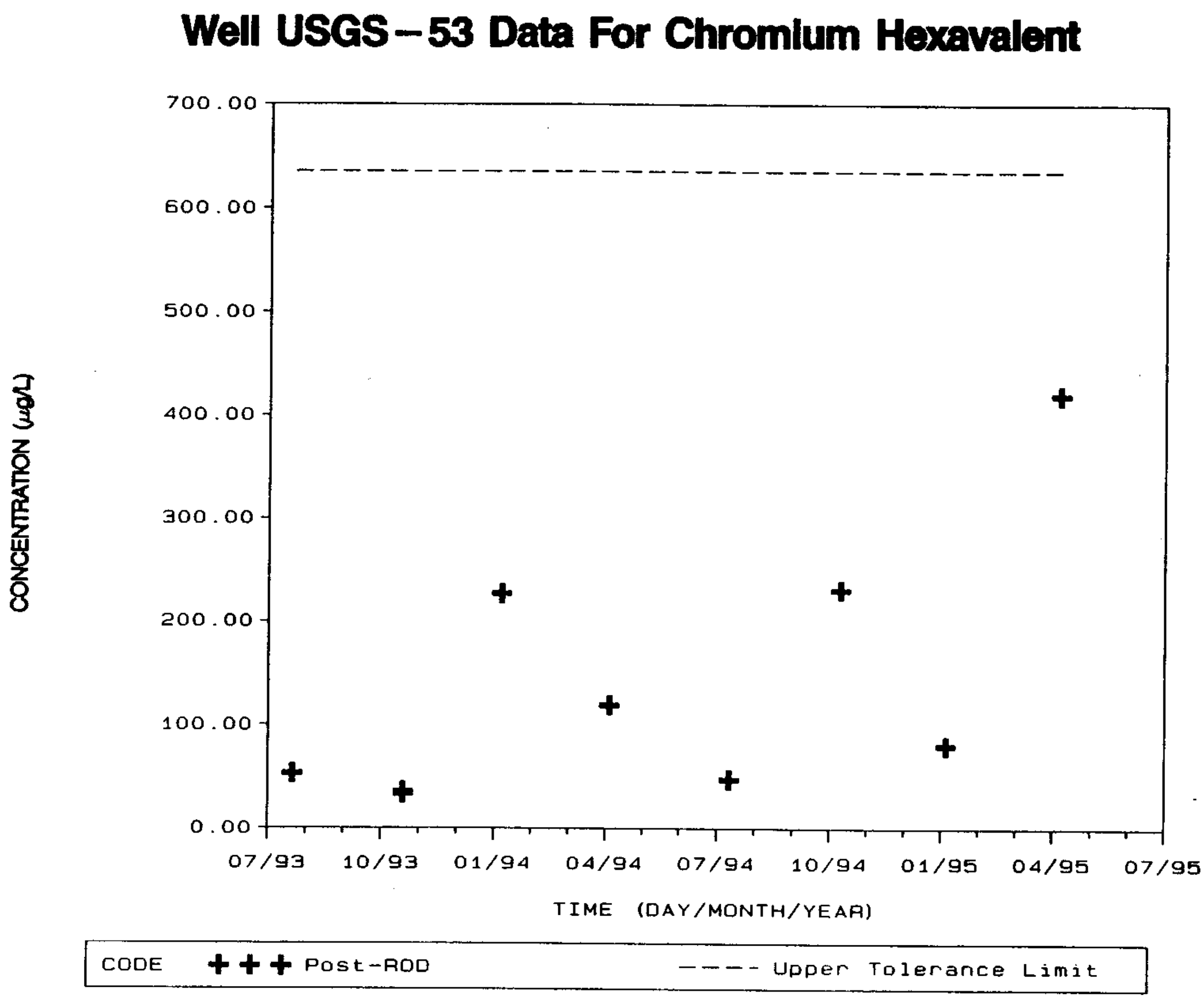
Well USGS-53 Data For Arsenic



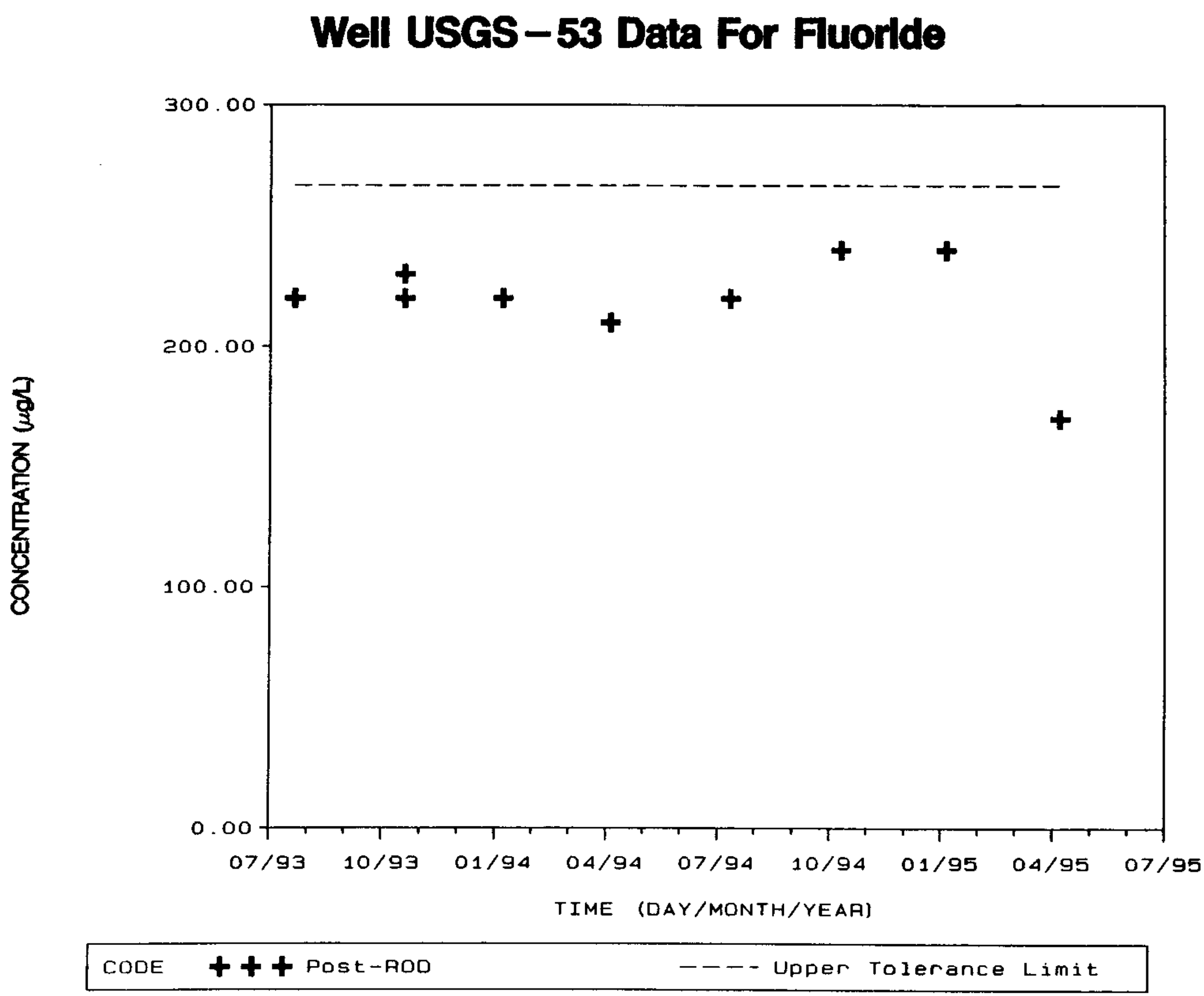
y = -0.0296x + 375.91
R Squared = 0.91

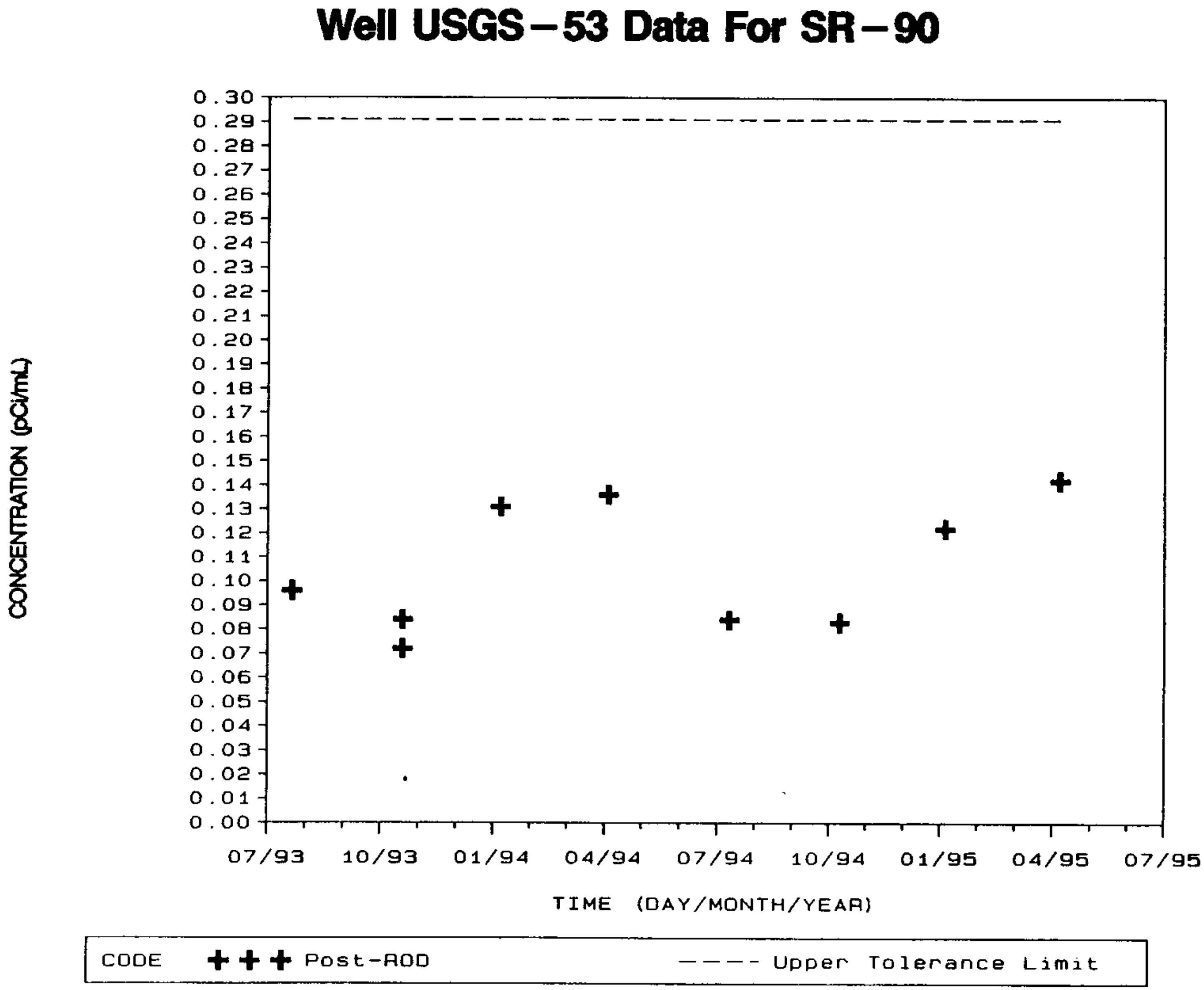
Well USGS-53 Data For Chromium



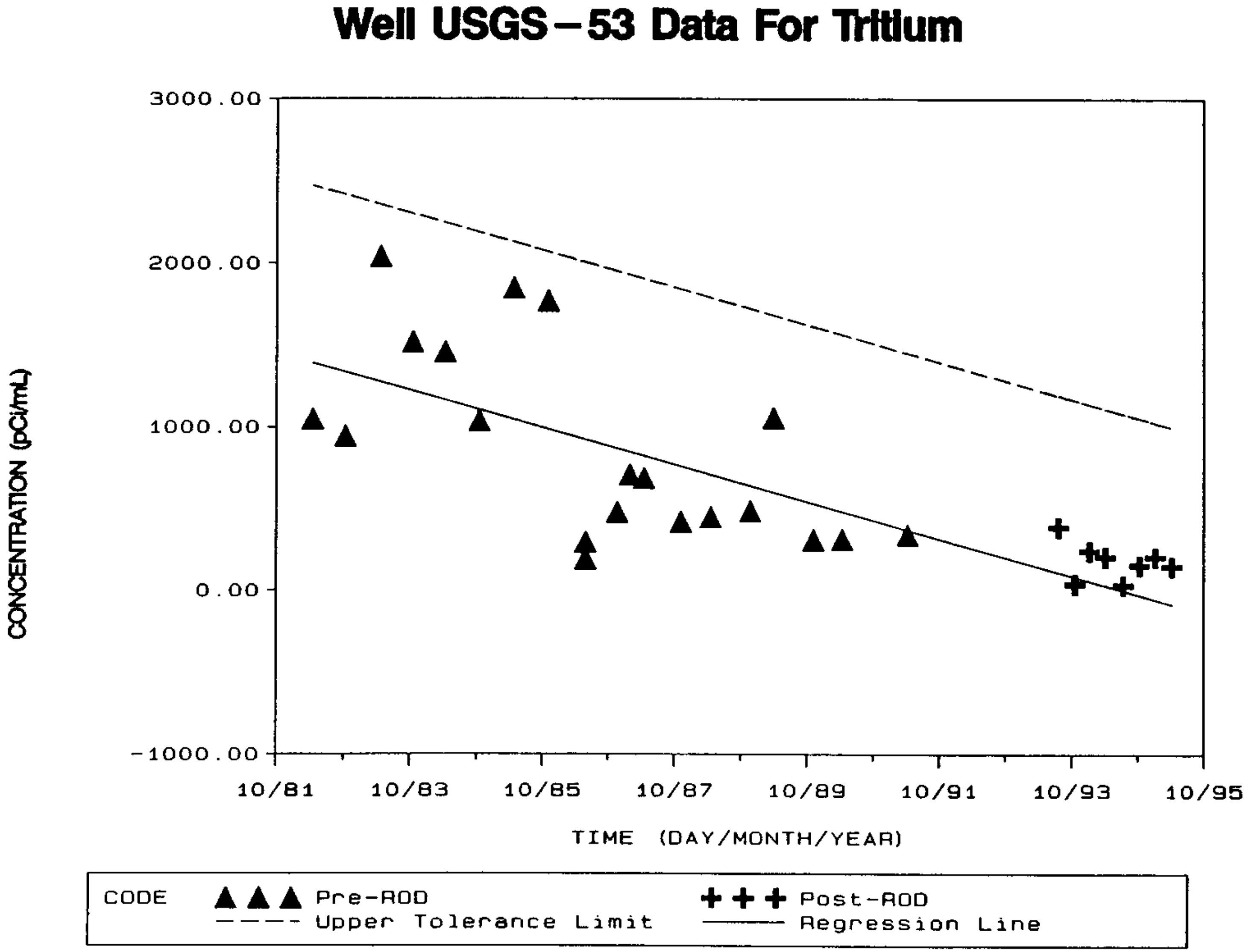


Well USGS-53 Data For Chromium Hexavalent
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
CONCENTRATION (µg/L)
07/93
10/93
01/94
04/94
07/94
10/94
01/95
04/95
07/95
TIME (DAY/MONTH/YEAR)
CODE
Post-ROD
Upper Tolerance Limit

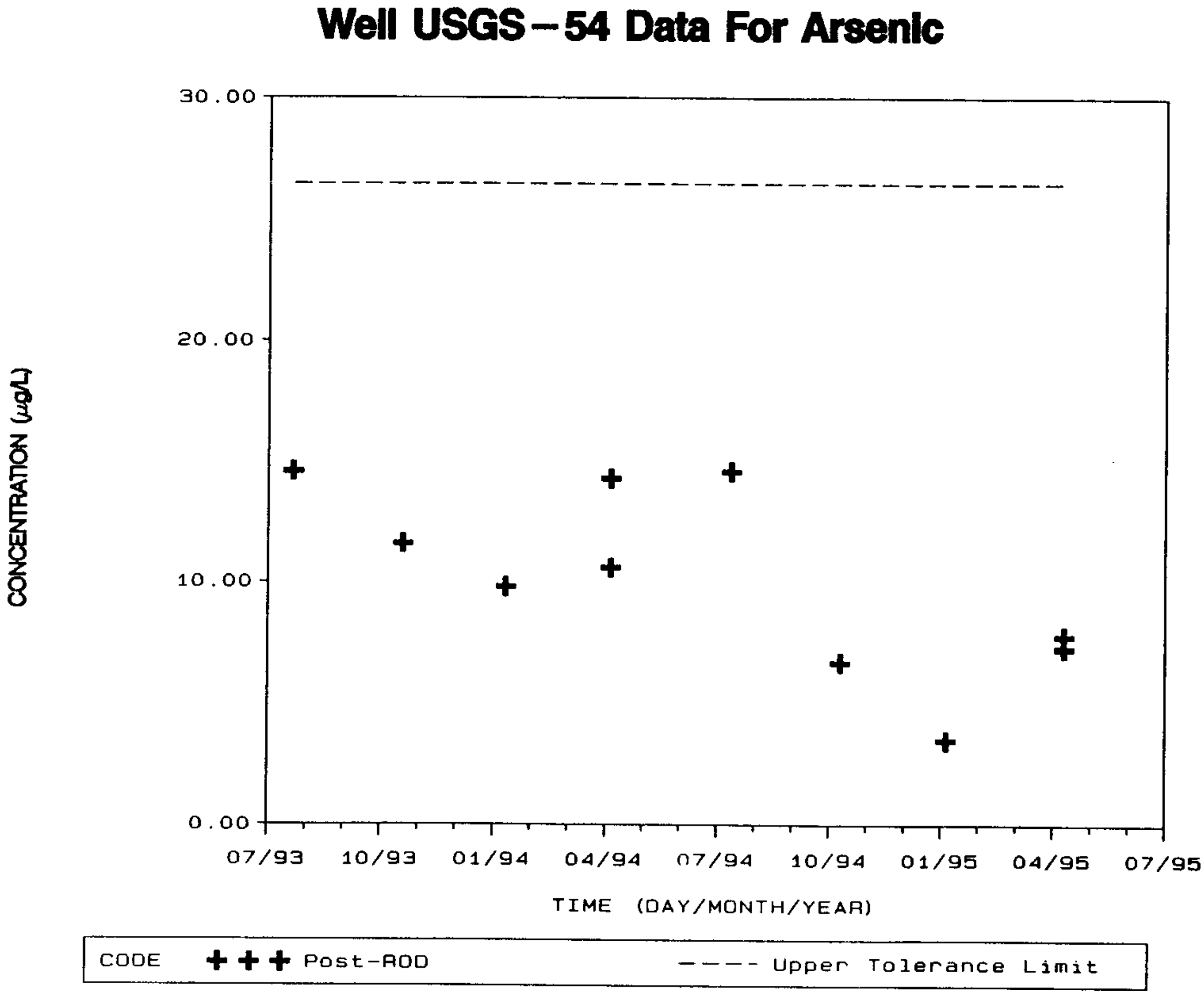

Well USGS-53 Data For Fluoride
CONCENTRATION (µg/L)
300.00
200.00
100.00
0.00
07/93
10/93
01/94
04/94
07/94
10/94
01/95
04/95
07/95
TIME (DAY/MONTH/YEAR)
CODE
Post-ROD
Upper Tolerance Limit



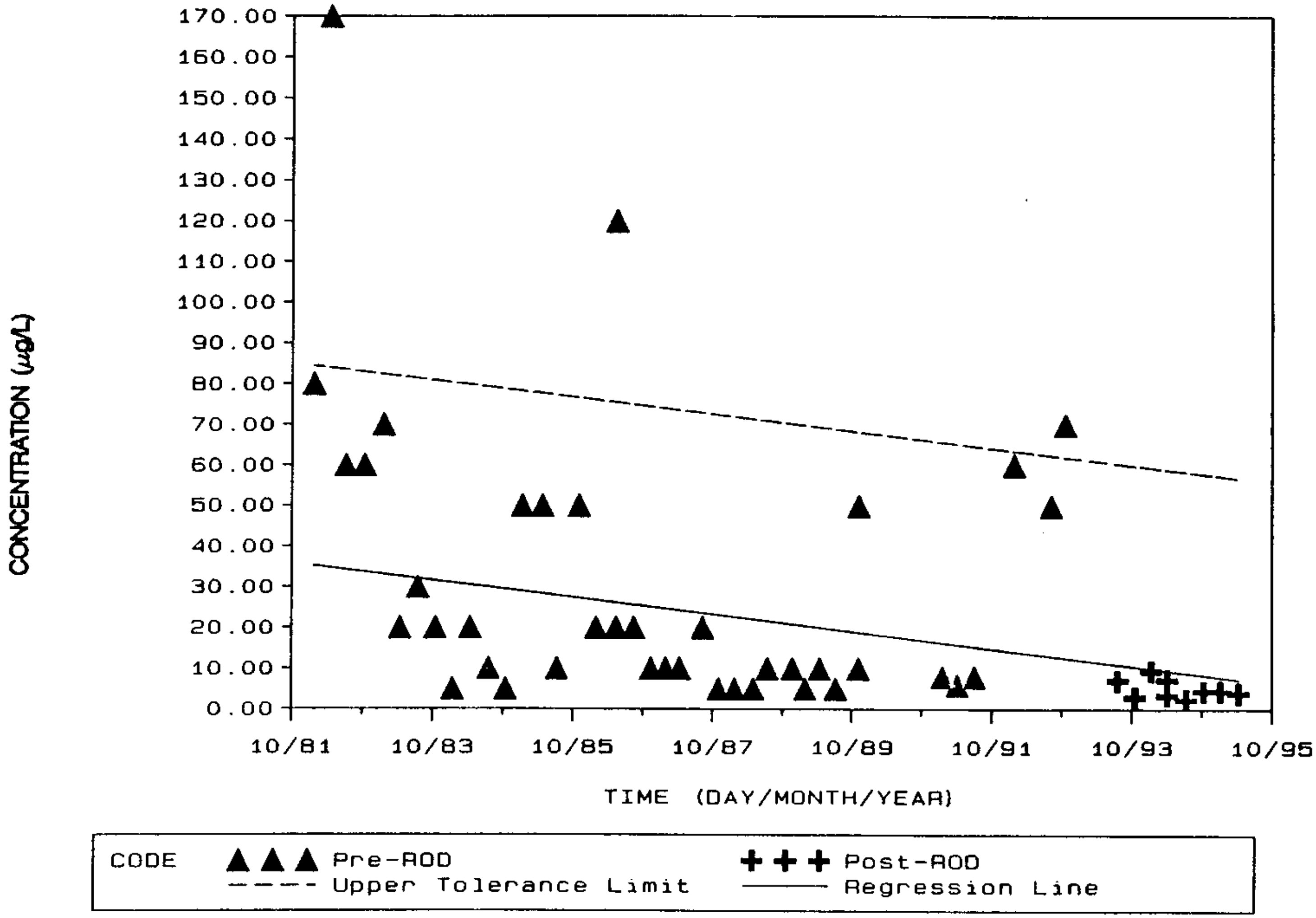
Well USGS-53 Data For SR-90
CONCENTRATION (pCi/mL)
0.30
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
07/93
10/93
01/94
04/94
07/94
10/94
01/95
04/95
07/95
TIME (DAY/MONTH/YEAR)
CODE
Post-ROD
Upper Tolerance Limit



y = -0.3103x + 3915.04
R Squared = 0.52

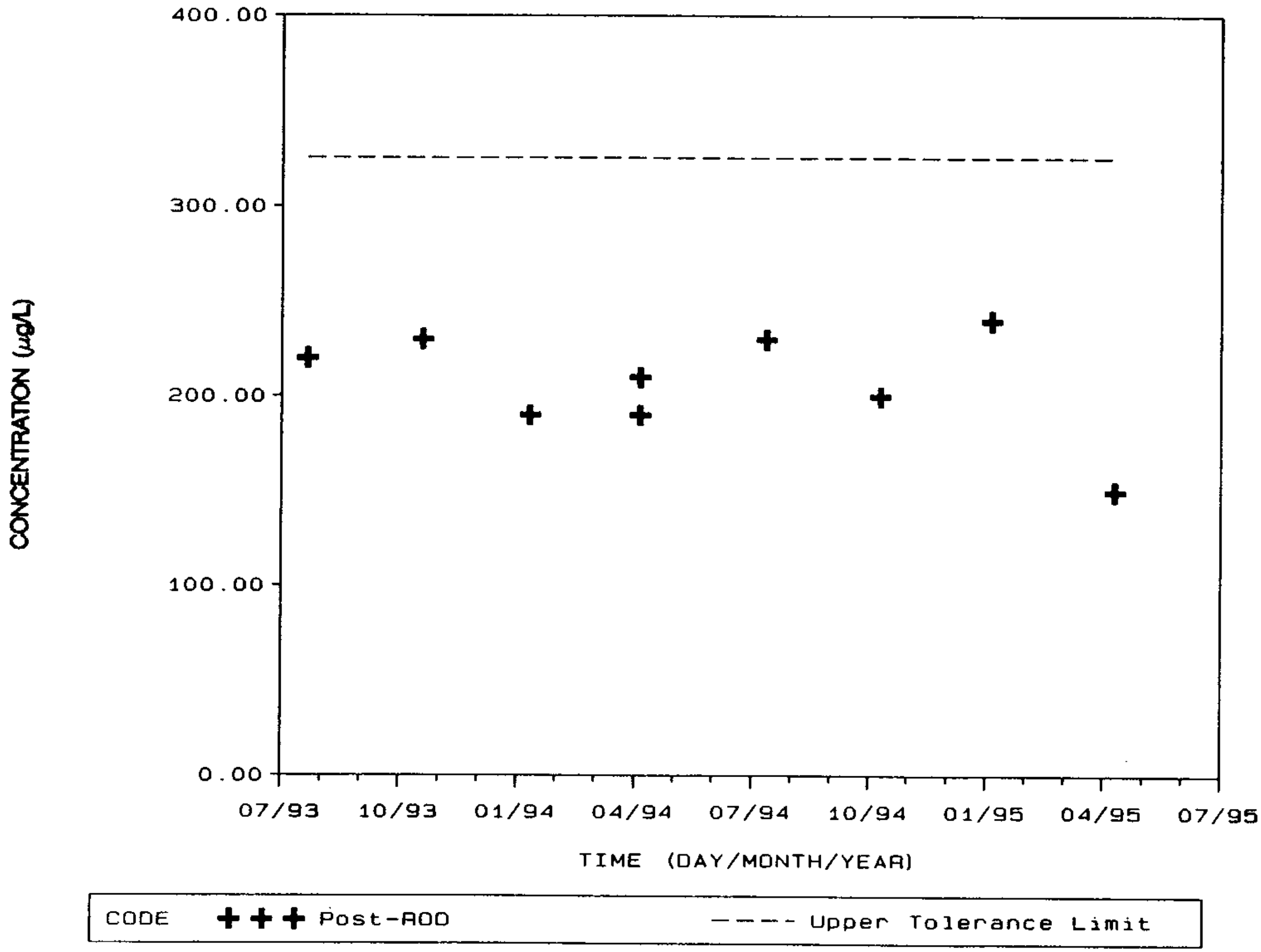

Well USGS-54 Data For Arsenic
30.00
20.00
10.00
0.00
CONCENTRATION (µg/L)
07/93
10/93
01/94
04/94
07/94
10/94
01/95
04/95
07/95
TIME (DAY/MONTH/YEAR)
CODE
Post-ROD
Upper Tolerance Limit

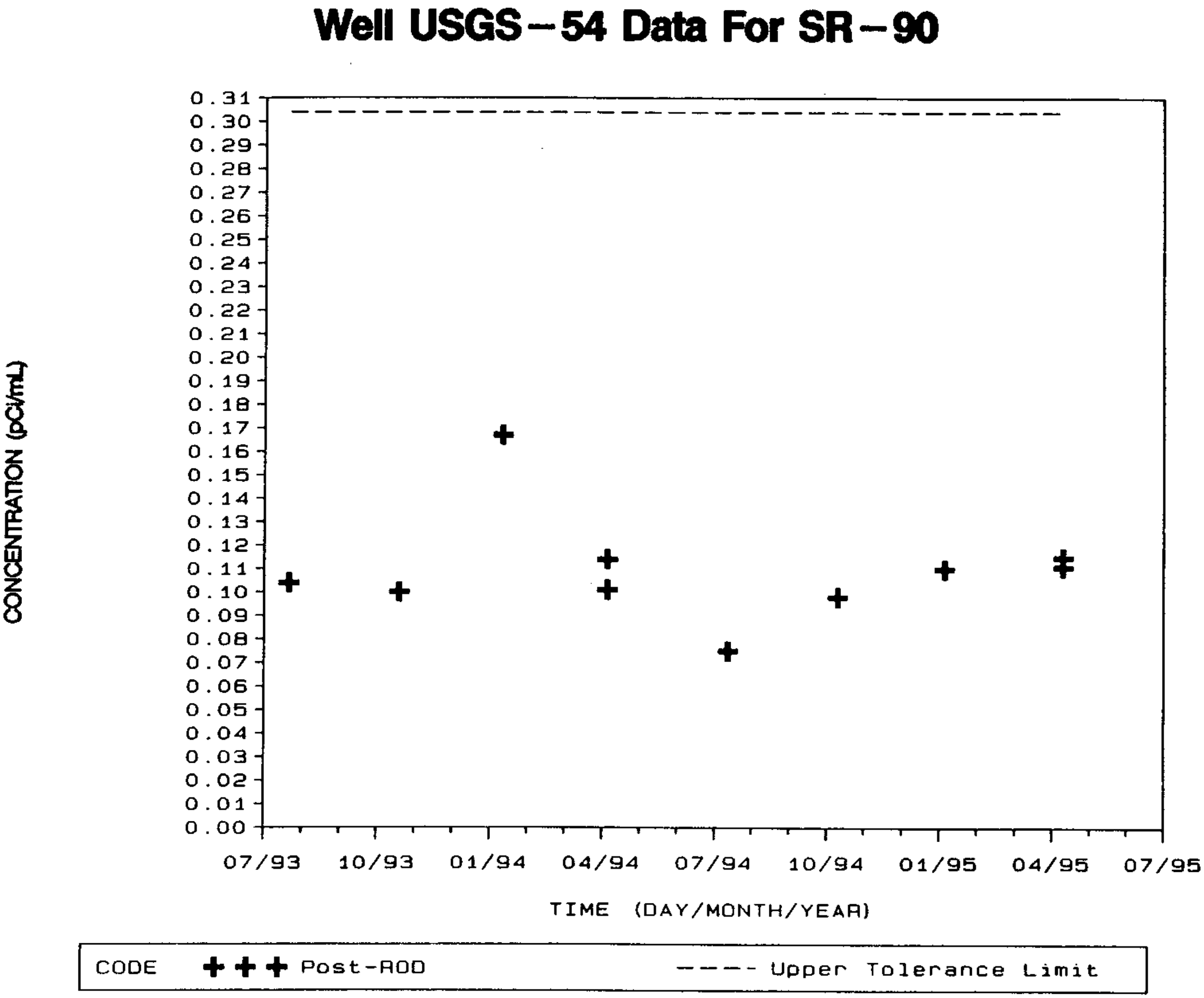
Well USGS-54 Data For Chromium



y = -0.0057x + 81.34
R Squared = 0.11

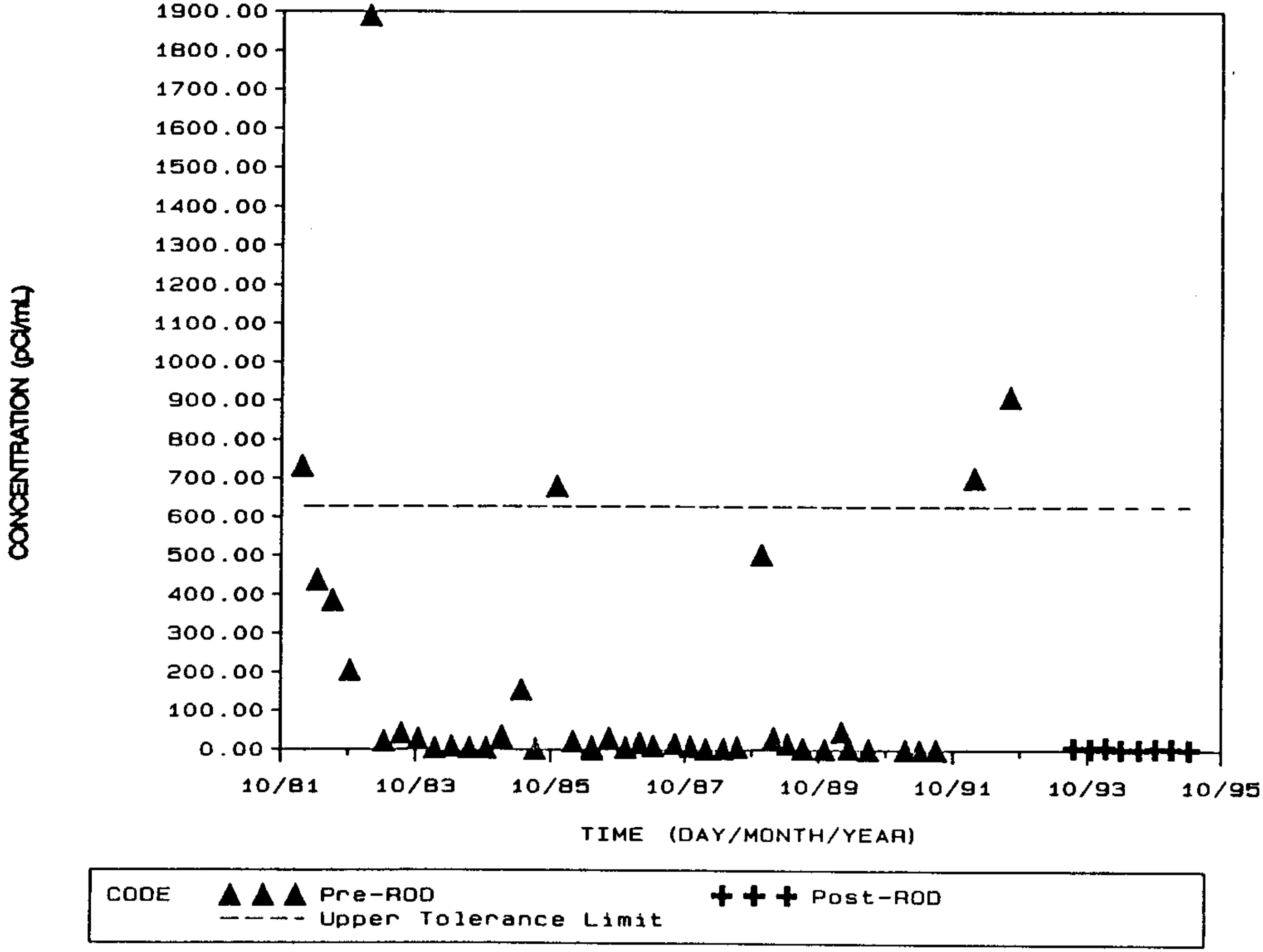
Well USGS-54 Data For Fluoride



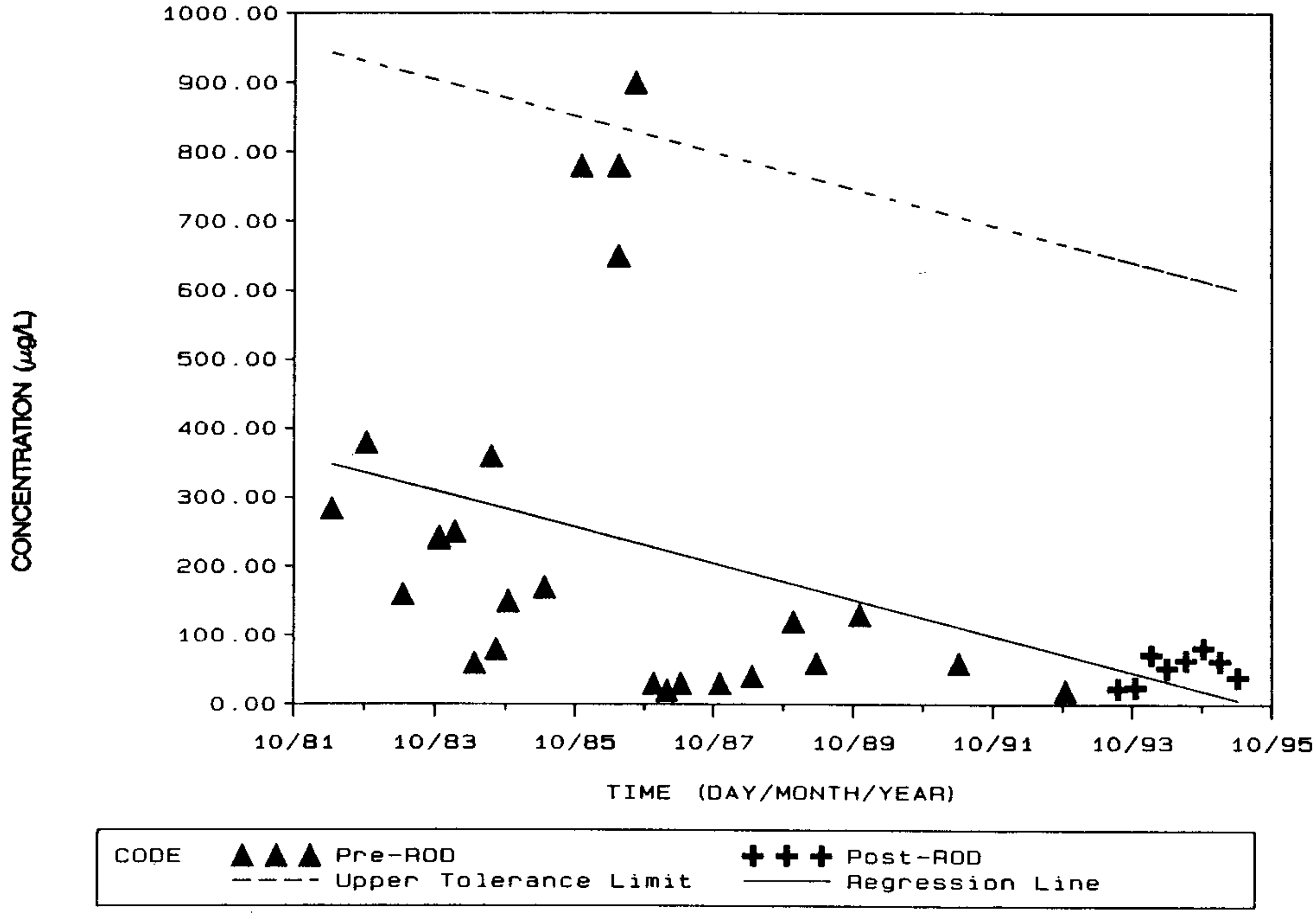


Well USGS-54 Data For SR-90
CONCENTRATION (pCi/mL)
0.31
0.30
0.29
0.28
0.27
0.26
0.25
0.24
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
07/93
10/93
01/94
04/94
07/94
10/94
01/95
04/95
07/95
TIME (DAY/MONTH/YEAR)
CODE
Post-ROD
Upper Tolerance Limit

Well USGS-54 Data For Tritium

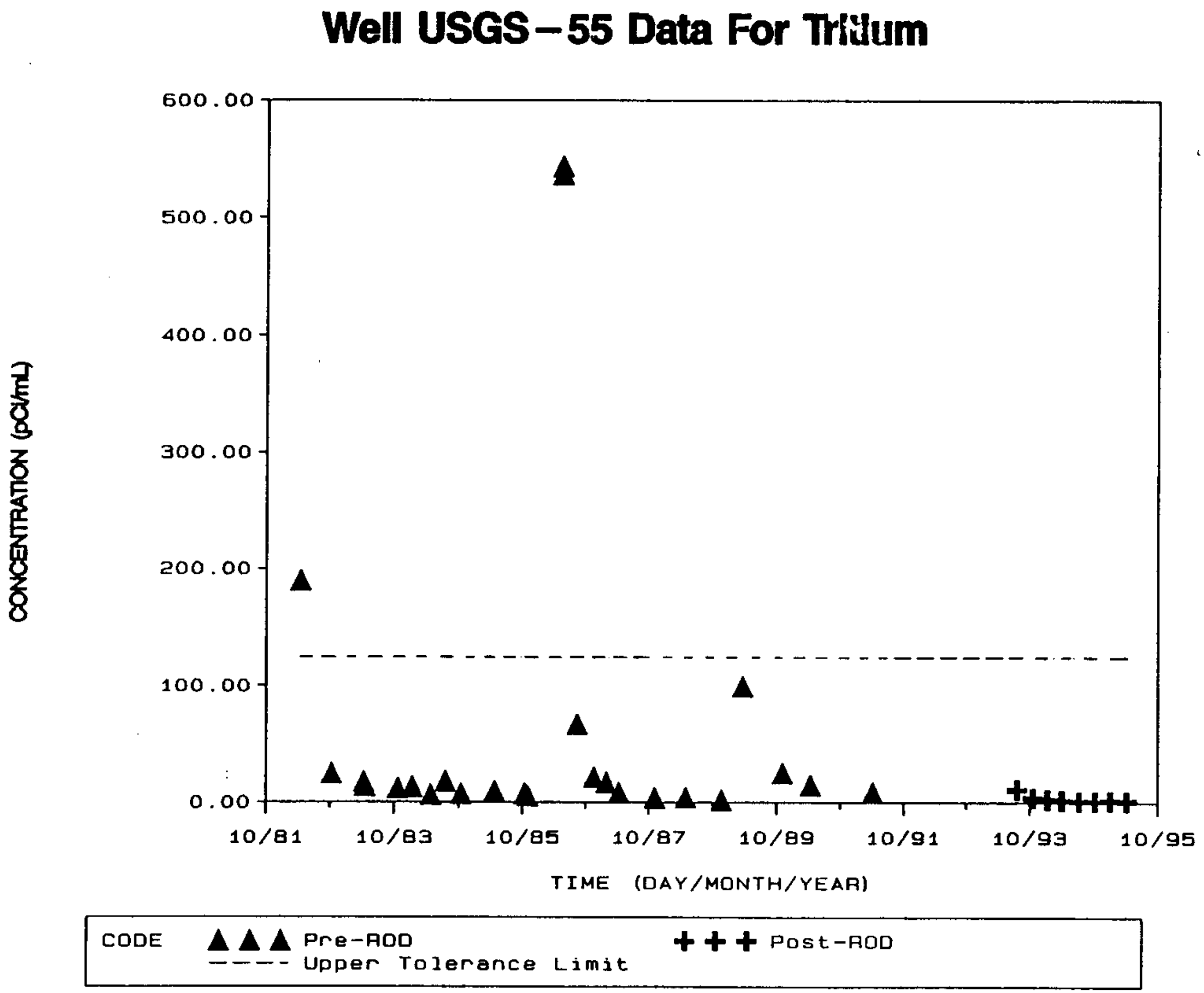


Well USGS – 55 Data For Chromium



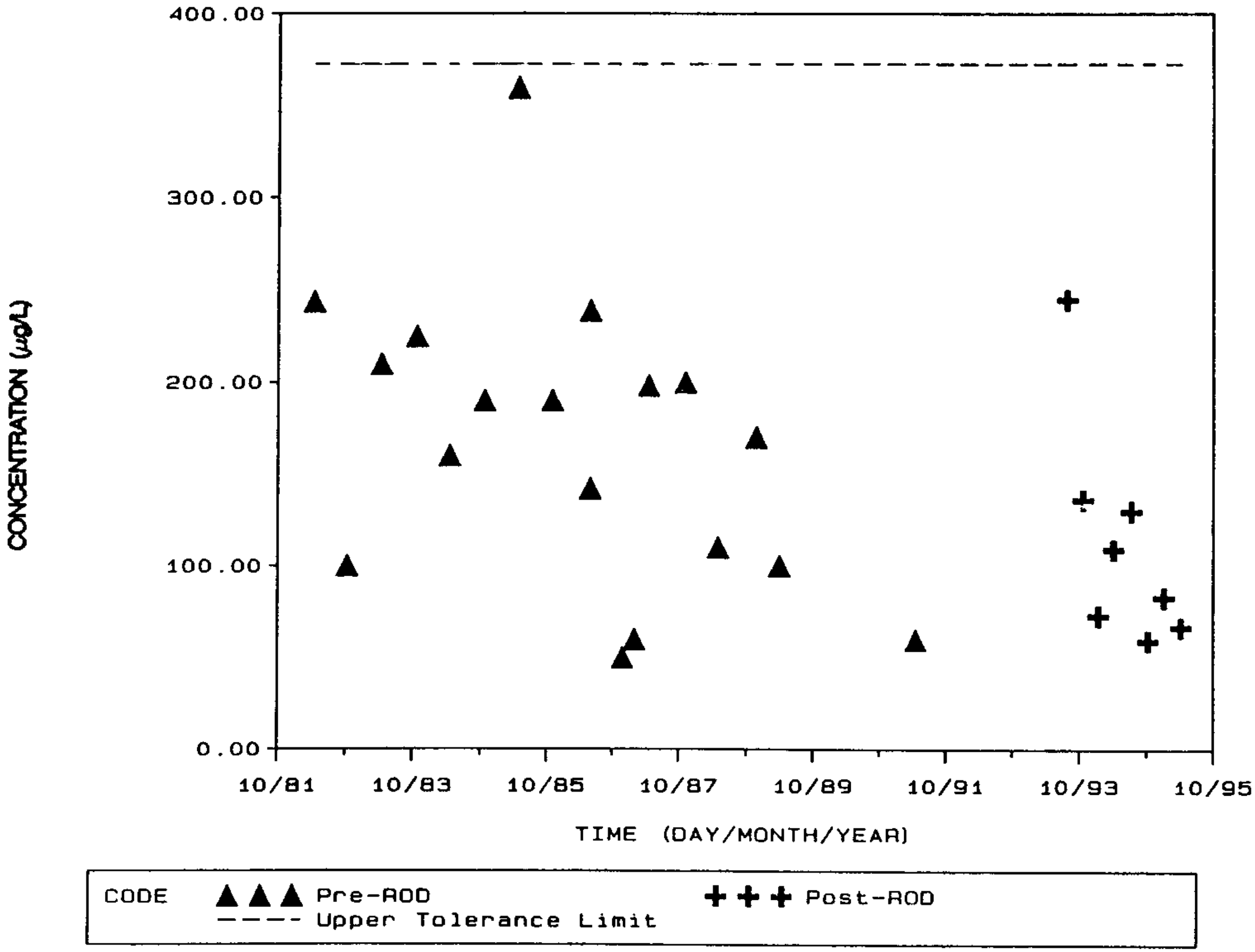
y = -0.0721x + 934.47

R Squared = 0.14

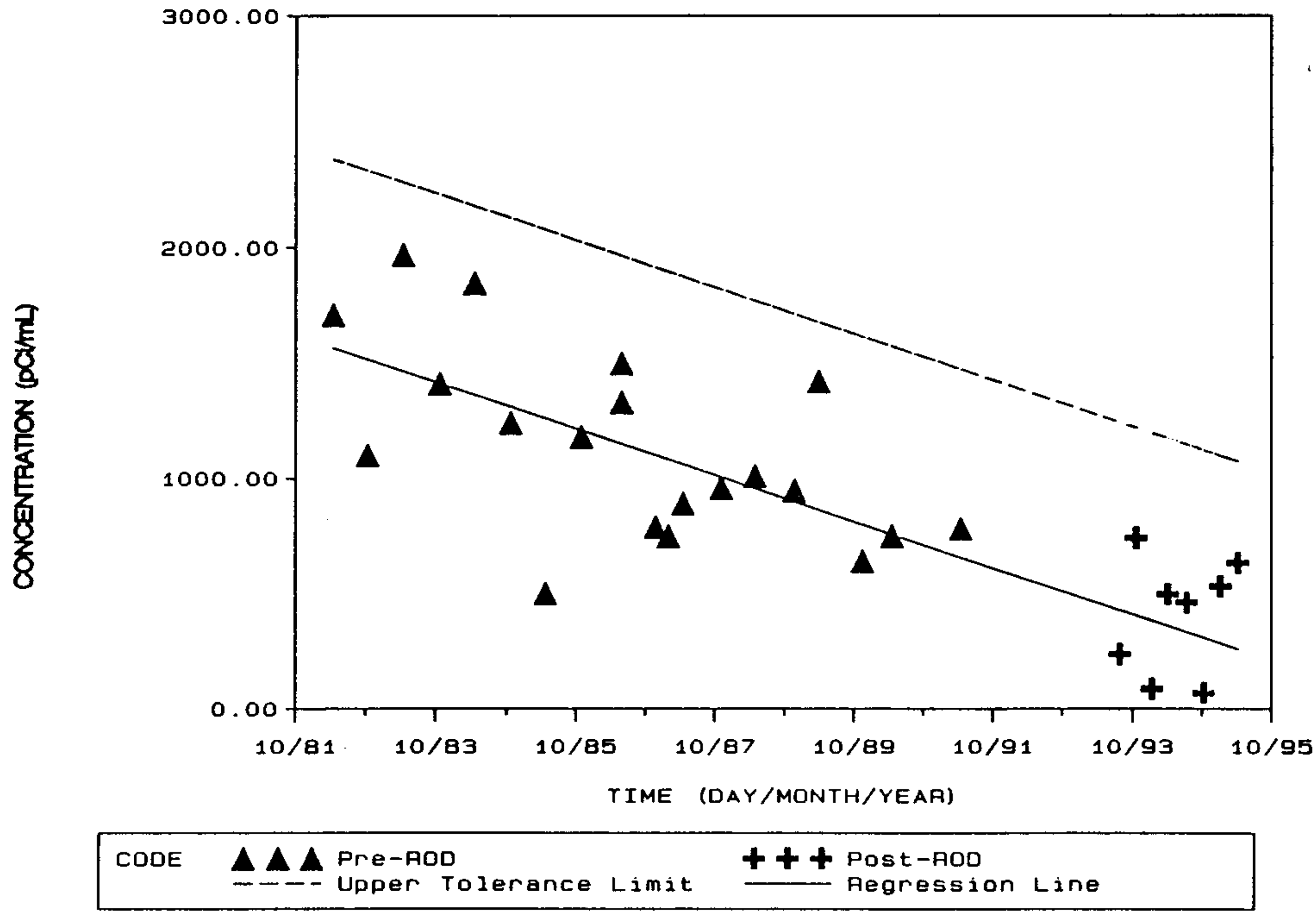


Well USGS-55 Data For Tritium
600.00
500.00
400.00
300.00
200.00
100.00
0.00
CONCENTRATION (pCi/mL)
10/81
10/83
10/85
10/87
10/89
10/91
10/93
10/95
TIME (DAY/MONTH/YEAR)
CODE
Pre-ROD
Upper Tolerance Limit
Post-ROD

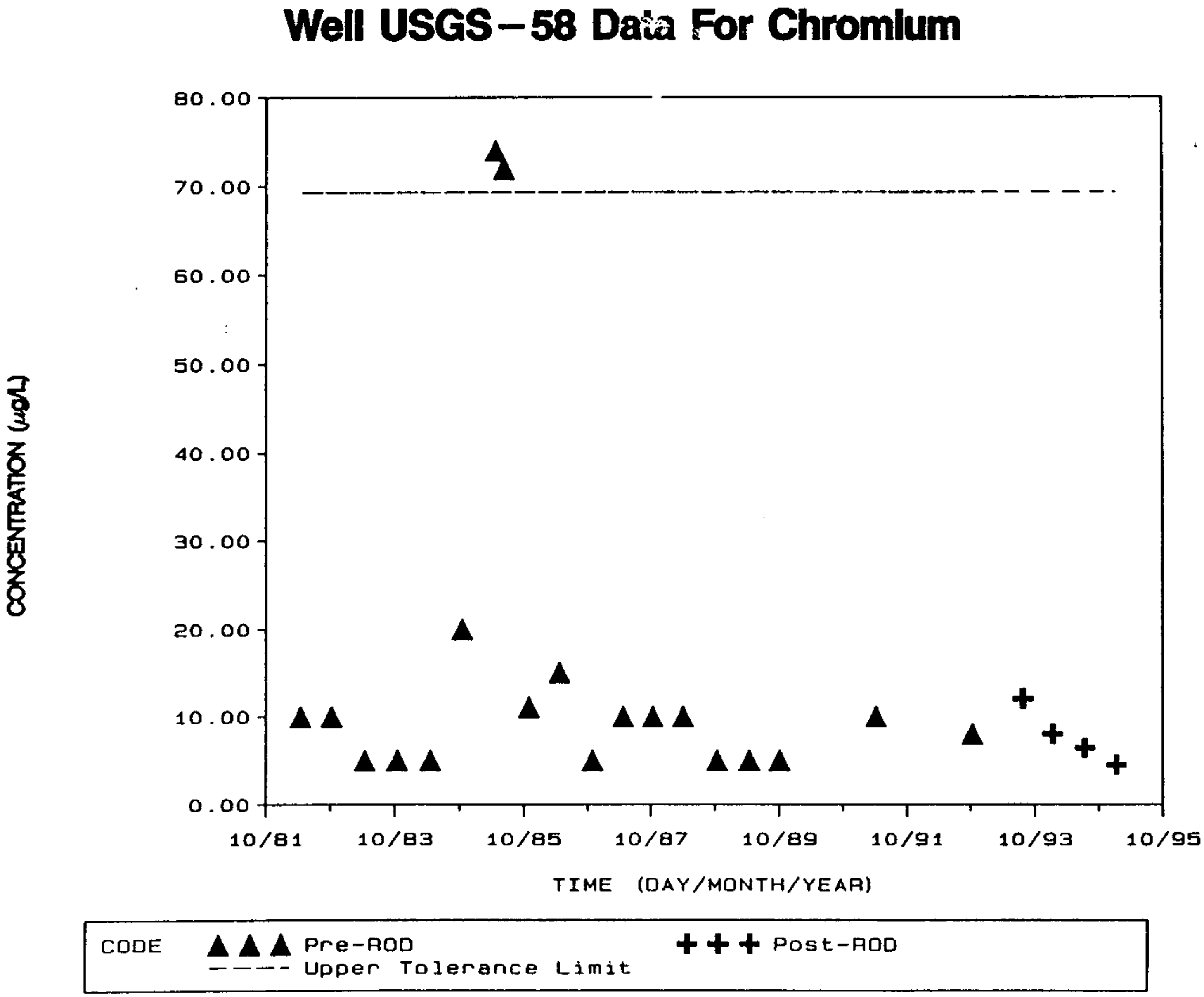
Well USGS-56 Data For Chromium



Well USGS-56 Data For Tritium

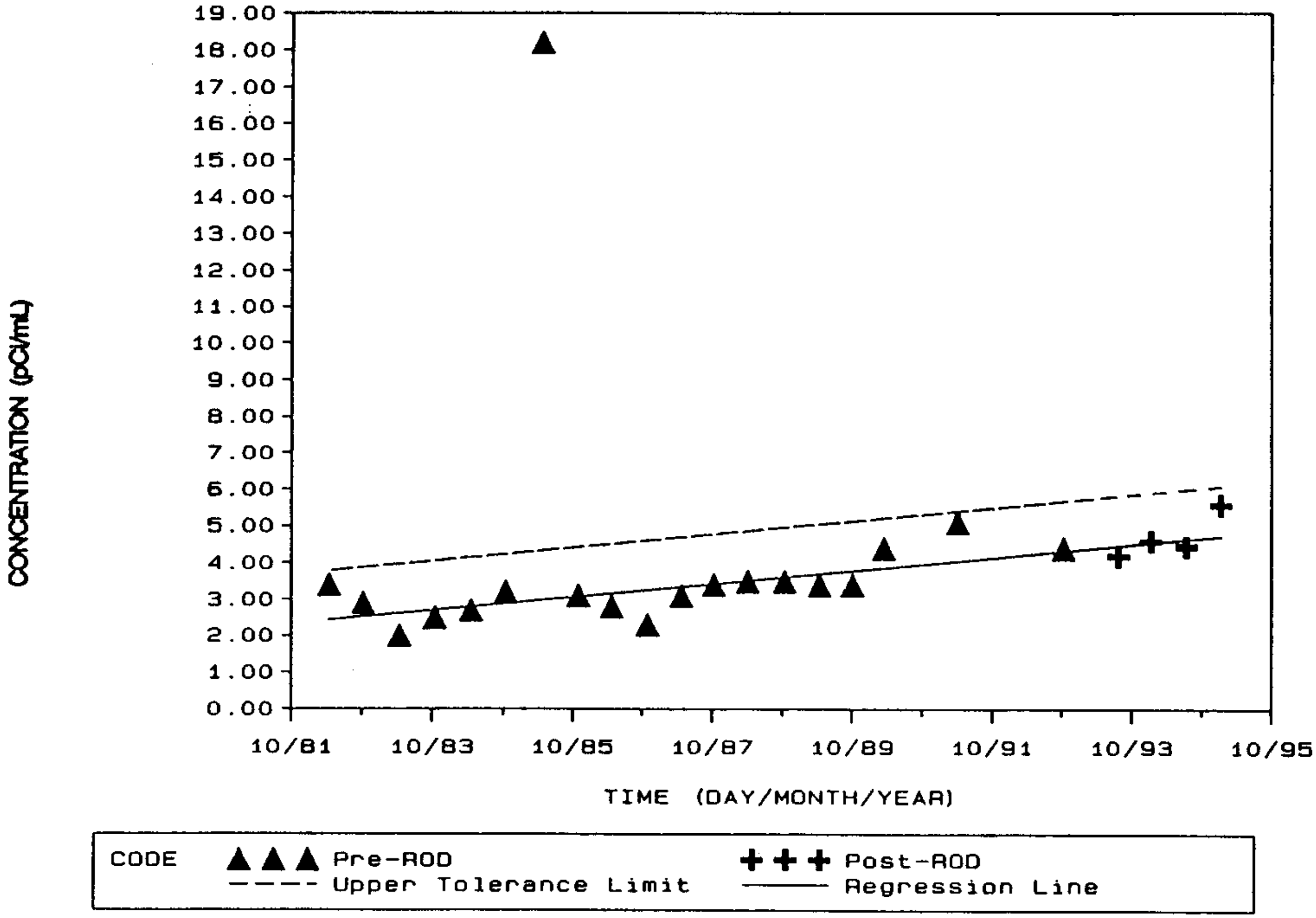


y = -0.2758x + 3809.85
R Squared = 0.58

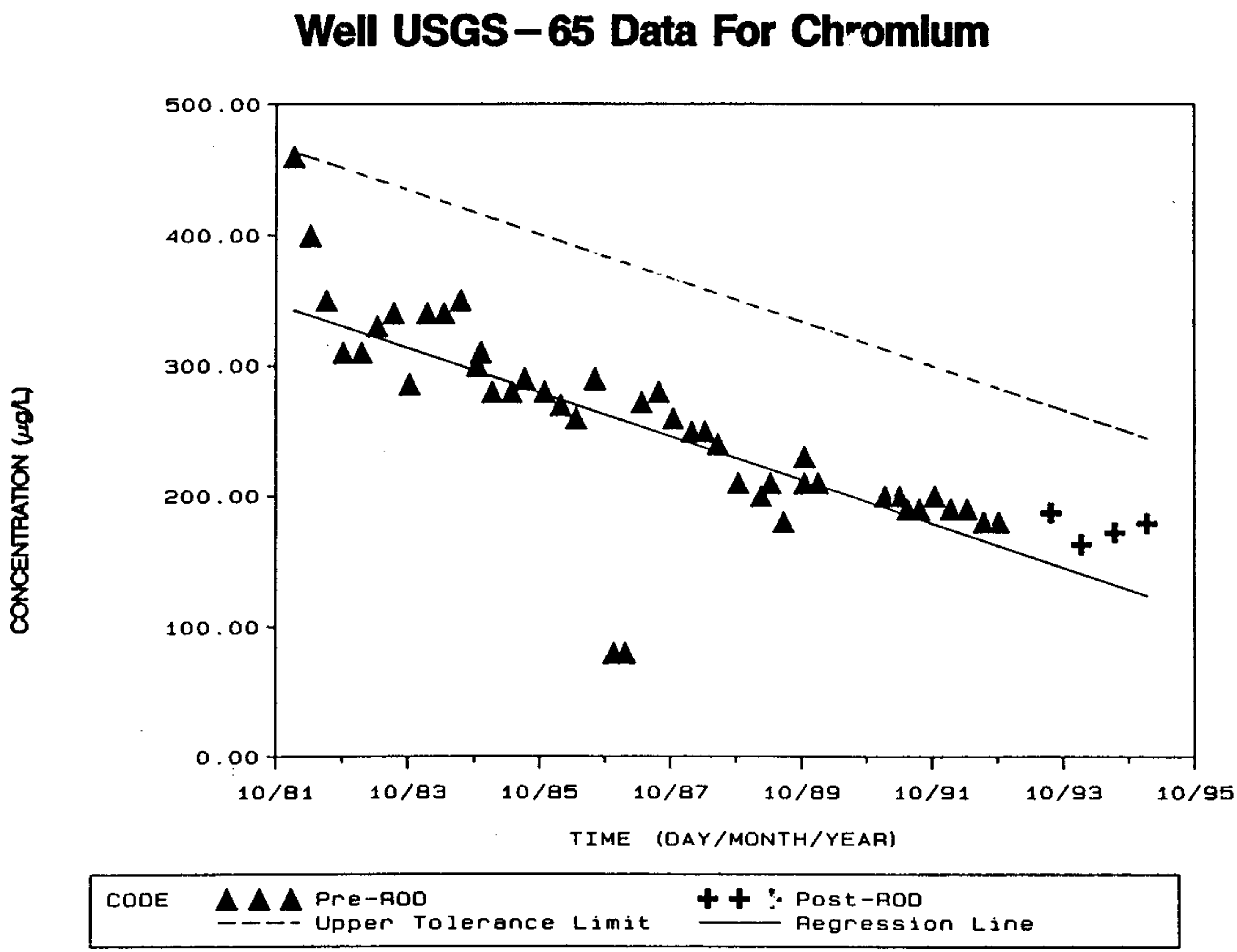


Well USGS-58 Data For Chromium
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
CONCENTRATION (µg/L)
10/81
10/83
10/85
10/87
10/89
10/91
10/93
10/95
TIME (DAY/MONTH/YEAR)
CODE Pre-ROD
Post-ROD
Upper Tolerance Limit

Well USGS – 58 Data For Tritium

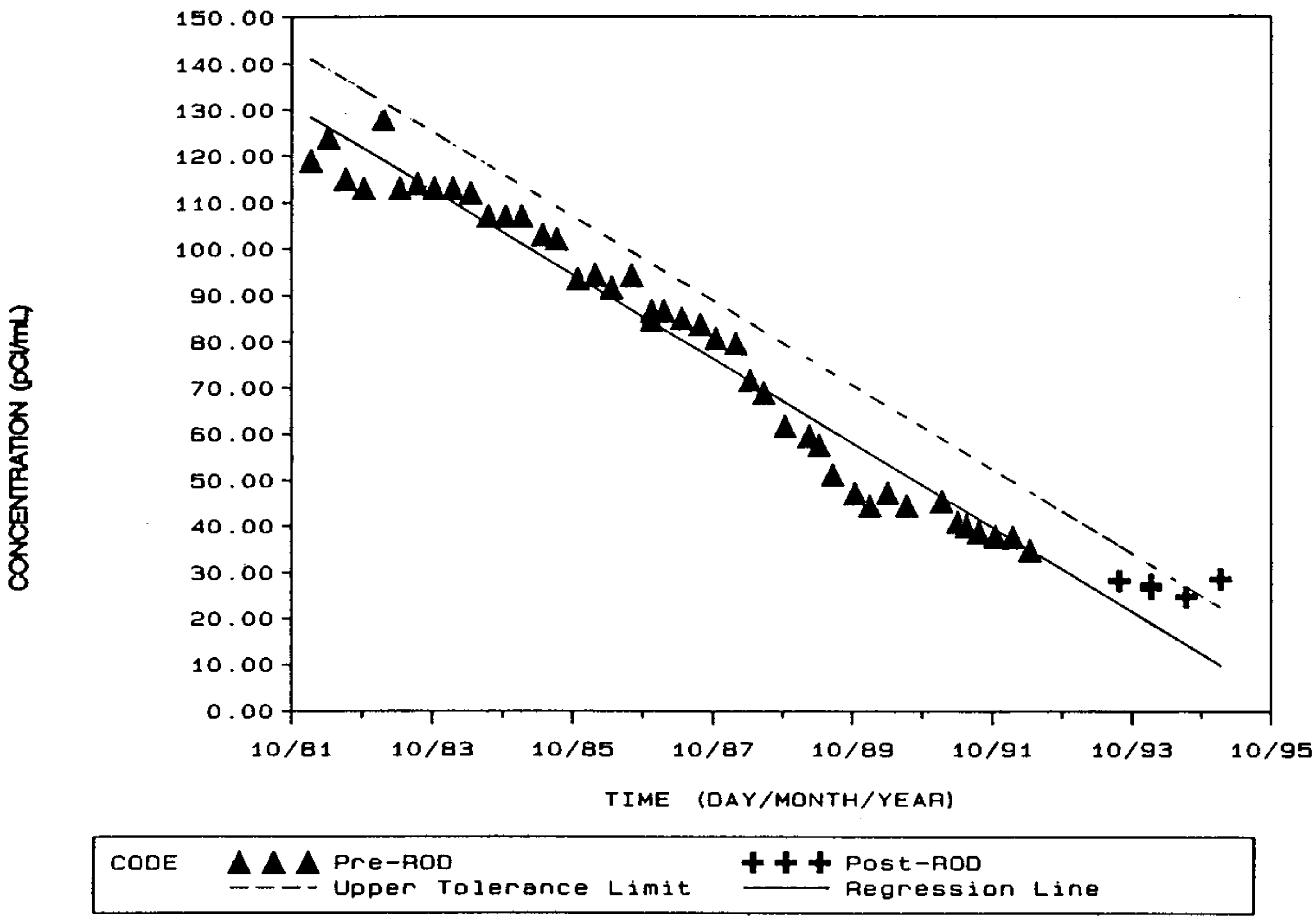


y = 0.0005x + -1.59
R Squared = 0.64



y = -0.0461x + 712.68
R Squared = 0.55

Well USGS-65 Data For Tritium



y = -0.025x + 329.06
R Squared = 0.97

Appendix E - Analysis Methods

The contour maps in this report were generated with computer software (SURFER © Golden Software, 1994) to permit computerized comparison of the spatial head distributions at different times. The computer-generated contour maps used actual field measurements supplemented by estimated heads at selected interpretation control points in areas where data were sparse or lacking. In some cases, the interpretation control points were well locations where water level data were not available at the time of interest. The use of estimated values as interpretation control points is a means of including in the computerized contouring process the interpretation that one would use in hand drawing the contours. There is often insufficient direct data for a computer contouring program to produce a map that an experienced analyst would draw by hand. Without some form of interpretive input from the analyst, computerized contouring often results in some unwarranted extrapolation of local trends. For the deep perched water system (DPWS) maps included in this report, interpretation control points were needed to help define the limits of the DPWS. The INEL scale regional set of heads were used for the aquifer head contour maps. Thus no extrapolation was required and no interpretation control points were used to prepare the aquifer contour maps. A series of articles on computer mapping and contouring appeared in the June and August 1992 issues of GEOBYTE magazine. These articles discuss the benefits and pitfalls of computerized contouring and the need and methods of including interpretation into the process as is done with hand contouring.